CAREER & TECHNOLOGY STUDIES

FORESTRY

GUIDE TO STANDARDS AND IMPLEMENTATION

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<i>Students</i>	
<i>Teachers</i>	✓

Program/Level: Career and Technology Studies/Secondary

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This document supersedes all previous versions of the *Career & Technology Studies Guide to Standards and Implementation*.

This publication is a support document. The advice and direction offered is suggestive except where it duplicates the Program of Studies. The Program of Studies—a prescriptive description of the expectations of student learning, focusing on what students are expected to know and be able to do—is issued under the authority of the Minister of Education pursuant to section 25(1) of the *School Act*, Statutes of Alberta, 1988, Chapter S-3.1 as amended, and is required for implementation. **Within this document, the Program of Studies is shaded so that the reader may readily identify all prescriptive statements or segments.**

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CAREER AND TECHNOLOGY STUDIES

A. PROGRAM RATIONALE AND PHILOSOPHY

Through Career and Technology Studies (CTS), secondary education in Alberta is responding to the many challenges of modern society, helping young people develop daily living skills and nurturing a flexible, well-qualified work force.

In Canada's information society, characterized by rapid change in the social and economic environment, students must be confident in their ability to respond to change and successfully meet the challenges they face in their own personal and work lives. In particular, they make decisions about what they will do when they finish high school. Many students will enter the work force, others will continue their education. All students face the challenges of growing independence and responsibility, and of entering post-secondary programs and/or the highly competitive workplace.

Secondary schools also face challenges. They must deliver, on a consistent basis, high quality, cost-effective programs that students, parents and the community find credible and relevant.

CTS helps schools and students meet these challenges. Schools can respond more efficiently and effectively to student and community needs and expectations by taking advantage of the opportunities in the CTS curriculum to design courses and access school, community and distance learning resources. Students can develop the confidence they need as they move into adult roles by assuming increased responsibility for their

learning; cultivating their individual talents, interests and abilities; and by defining and acting on their goals.

As an important component of education in Alberta secondary schools, CTS promotes student achievement by setting clear expectations and recognizing student success. Students in CTS develop competencies—the knowledge, skills and attitudes they are expected to demonstrate, that is, what they know and what they are able to do.

Acquired competencies can be applied now and in the future as students make a smooth transition into adult roles in the family, community, workplace and/or further education. To facilitate this transition, clearly stated expectations and standards have been defined in cooperation with teachers, business and industry representatives and post-secondary educators.

CTS offers all students important learning opportunities. Regardless of the particular area of study chosen, *students in CTS will:*

- develop skills that can be applied in their daily lives, now and in the future
- refine career-planning skills
- develop technology-related skills
- enhance employability skills
- apply and reinforce learnings developed in other subject areas.

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In CTS, students build skills they can apply in their everyday lives. For example, in the CTS program, particularly at the introductory levels, students have the opportunity to improve their ability to make sound consumer decisions and to appreciate environmental and safety precautions.

A career encompasses more than activities just related to a person's job or occupation; it involves one's personal life in both local and global contexts; e.g., as a family member, a friend, a community volunteer, a citizen of the world.

The integration of careers throughout the CTS program helps students to make effective career decisions and to target their efforts. CTS students will have the opportunity to expand their knowledge about careers, occupations and job opportunities, as well as the education and/or training requirements involved. Also, students come to recognize the need for lifelong learning.

Students in CTS have the opportunity to use and apply technology and systems effectively and efficiently. This involves:

- a decision regarding which processes and procedures best suit the task at hand
- the appropriate selection and skilled use of the tools and/or resources available
- an assessment of and management of the impact the use of the technology may have on themselves, on others and on the environment.

Integrated throughout CTS are employability skills, those basic competencies that help students develop their personal management and social skills. Personal management skills are improved as students take increased responsibility for their learning, design innovative solutions to problems and challenges, and manage resources effectively and efficiently. Social skills improve through learning experiences that require students to work effectively with others, demonstrate teamwork and leadership, and maintain high standards in safety and accountability.

As well as honing employability skills, CTS reinforces and enhances learnings developed in core and other optional courses. The curriculum emphasizes, as appropriate, the effective application of communication and numeracy skills.

In addition to the common outcomes described above, students focusing on a particular area of study will develop career-specific competencies that support entry into the workplace and/or related post-secondary programs. Career-specific competencies can involve understanding and applying appropriate terminology, processes and technologies related to a specific career, occupation or job.

PROGRAM OUTCOMES

The program outcomes describe the basic competencies integrated throughout the CTS program.

Within an applied context relevant to personal goals, aptitudes and abilities; *the student* in CTS will:

- demonstrate the basic knowledge, skills and attitudes necessary for achievement and fulfillment in personal life
- develop an action plan that relates personal interests, abilities and aptitudes to career opportunities and requirements
- use technology effectively to link and apply appropriate tools, management and processes to produce a desired outcome
- develop basic competencies (employability skills), by:
 - selecting relevant, goal-related activities, ranking them in order of importance, allocating necessary time, and preparing and following schedules (managing learning)
 - linking theory and practice, using resources, tools, technology and processes responsibly and efficiently (managing resources)
 - applying effective and innovative decision-making and problem-solving strategies in the design, production, marketing and consumption of goods and services (problem solving and innovation)
 - demonstrating appropriate written and verbal skills, such as composition, summarization and presentation (communicating effectively)
 - participating as a team member by working cooperatively with others and contributing to the group with ideas, suggestions and effort (working with others)

- maintaining high standards of ethics, diligence, attendance and punctuality, following safe procedures consistently, and recognizing and eliminating potential hazards (demonstrating responsibility).

PROGRAM ORGANIZATION

CURRICULUM STRUCTURE

Career and Technology Studies is organized into **strands** and **courses**.

Strands in CTS define competencies that help students:

- build daily living skills
- investigate career options
- use technology (managing, processes, tools) effectively and efficiently
- prepare for entry into the workplace and/or related post-secondary programs.

In general, strands relate to selected industry sectors offering positive occupational opportunities for students. Some occupational opportunities require further education after high school, and some allow direct entry into the workplace. Industry sectors encompass goods-producing industries, such as agriculture, manufacturing and construction; and service-producing industries, such as business, health, finance and insurance.

Courses are the building blocks for each strand. They define what a student is expected to know and be able to do (exit-level *competencies*). Courses also specify prerequisites. Recommendations for course parameters, such as instructional qualifications, facilities and equipment can be found in the guides to implementation.

The competencies a student must demonstrate to achieve success in a course are defined through *general outcomes*. Senior high school students who can demonstrate the general outcomes defined for a CTS course; i.e., who have the designated competencies, will qualify for 1 credit toward their high school diploma.

Specific outcomes provide a more detailed framework for instruction. Within the context of the general outcomes, the specific outcomes further define the knowledge, skills and attitudes the student should acquire.

The following chart shows the 22 strands that comprise the CTS program and the number of 1-credit courses available in each strand.

Strand	No. of Courses
1. Agriculture	33
2. Career Transitions	31
3. Communication Technology	33
4. Community Health	31
5. Construction Technologies	46
6. Cosmetology Studies	58
7. Design Studies	31
8. Electro-Technologies	37
9. Energy and Mines	26
10. Enterprise and Innovation	8
11. Fabrication Studies	41
12. Fashion Studies	29
13. Financial Management	14
14. Foods	37
15. Forestry	21
16. Information Processing	48
17. Legal Studies	13
18. Logistics	12
19. Management and Marketing	20
20. Mechanics	54
21. Tourism Studies	24
22. Wildlife	17

LEVELS OF ACHIEVEMENT

Courses are organized into three levels of achievement: **introductory**, **intermediate** and **advanced**. As students progress through the levels, they will be expected to meet higher standards and demonstrate an increased degree of competence, in both the program outcomes and the general outcomes defined for individual courses.

Introductory level courses help students build daily living skills and form the basis for further learning. Introductory courses are for students who have no previous experience in the strand.

Intermediate level courses build on the competencies developed at the introductory level. They provide a broader perspective, helping students recognize the wide range of related career opportunities available within the strand.

Advanced level courses refine expertise and help prepare students for entry into the workplace or a related post-secondary program.

The graph below illustrates the relative emphasis on the aspects of career planning at each of the levels.

CURRICULUM AND ASSESSMENT STANDARDS

Curriculum standards in CTS define what students must know and be able to do. Curriculum standards are expressed through the program outcomes for CTS, and through general and specific outcomes defined for individual courses within each strand.

Assessment standards define how student performance is to be judged. In CTS, each assessment standard defines the conditions and criteria to be used for assessing the competencies associated with each general outcome. To receive credit for a course, students must demonstrate competency at the level specified by the conditions and criteria defined for each general outcome.

Students throughout the province receive a fair and reliable assessment as they use the standards to guide their efforts, thus ensuring they participate more effectively and successfully in the learning and assessment process. Standards at advanced levels are, as much as possible, linked to workplace and post-secondary entry-level requirements.

TYPES OF COMPETENCIES

Two types of competencies are defined within the CTS program: basic and career-specific.

Basic competencies are generic to any career area and are developed within each course. Basic competencies include:

- personal management; e.g., managing learning, being innovative, ethics, managing resources
- social; e.g., communication, teamwork, leadership and service, demonstrating responsibility (safety and accountability).

Career-specific competencies relate to a particular strand. These competencies build daily living skills at the introductory levels and support the smooth transition to the workplace and/or post-secondary programs at the intermediate and advanced levels.

The model below shows the relationship of the two types of competencies within the 22 strands of the CTS program.

BASIC COMPETENCIES REFERENCE GUIDE

The chart below outlines basic competencies that students endeavour to develop and enhance in each of the CTS strands and courses. Students' basic competencies should be assessed through observations involving the student, teacher(s), peers and others as they complete the requirements for each course. In general, there is a progression of task complexity and student initiative as outlined in the Developmental Framework★. As students progress through Stages 1, 2, 3 and 4 of this reference guide, they build on the competencies gained in earlier stages. Students leaving high school should set themselves a goal of being able to demonstrate Stage 3 performance.

Suggested strategies for classroom use include:

- having students rate themselves and each other
- using in reflective conversation between teacher and student
- highlighting areas of strength
- tracking growth in various CTS strands
- highlighting areas upon which to focus
- maintaining a student portfolio.

Stage 1— <i>The student:</i>	Stage 2— <i>The student:</i>	Stage 3— <i>The student:</i>	Stage 4— <i>The student:</i>
Managing Learning <ul style="list-style-type: none"> ☐ comes to class prepared for learning ☐ follows basic instructions, as directed ☐ acquires specialized knowledge, skills and attitudes ☐ identifies criteria for evaluating choices and making decisions ☐ uses a variety of learning strategies	<ul style="list-style-type: none"> ☐ follows instructions, with limited direction ☐ sets goals and establishes steps to achieve them, with direction ☐ applies specialized knowledge, skills and attitudes in practical situations ☐ identifies and applies a range of effective strategies for solving problems and making decisions ☐ explores and uses a variety of learning strategies, with limited direction	<ul style="list-style-type: none"> ☐ follows detailed instructions on an independent basis ☐ sets clear goals and establishes steps to achieve them ☐ transfers and applies specialized knowledge, skills and attitudes in a variety of situations ☐ uses a range of critical thinking skills to evaluate situations, solve problems and make decisions ☐ selects and uses effective learning strategies ☐ cooperates with others in the effective use of learning strategies	<ul style="list-style-type: none"> ☐ demonstrates self-direction in learning, goal setting and goal achievement ☐ transfers and applies learning in new situations; demonstrates commitment to lifelong learning ☐ thinks critically and acts logically to evaluate situations, solve problems and make decisions ☐ provides leadership in the effective use of learning strategies
Managing Resources <ul style="list-style-type: none"> ☐ adheres to established timelines; uses time/schedules/planners effectively ☐ uses information (material and human resources), as directed ☐ uses technology (facilities, equipment, supplies), as directed, to perform a task or provide a service ☐ maintains, stores and/or disposes of equipment and materials, as directed 	<ul style="list-style-type: none"> ☐ creates and adheres to timelines, with limited direction; uses time/schedules/planners effectively ☐ accesses and uses a range of relevant information (material and human resources), with limited direction ☐ uses technology (facilities, equipment, supplies), as appropriate, to perform a task or provide a service, with minimal assistance and supervision ☐ maintains, stores and/or disposes of equipment and materials, with limited assistance 	<ul style="list-style-type: none"> ☐ creates and adheres to detailed timelines on an independent basis; prioritizes task; uses time/schedules/planners effectively ☐ accesses a range of information (material and human resources), and recognizes when additional resources are required ☐ selects and uses appropriate technology (facilities, equipment, supplies) to perform a task or provide a service on an independent basis ☐ maintains, stores and/or disposes of equipment and materials on an independent basis 	<ul style="list-style-type: none"> ☐ creates and adheres to detailed timelines; uses time/schedules/planners effectively; prioritizes tasks on a consistent basis ☐ uses a wide range of information (material and human resources) in order to support and enhance the basic requirement ☐ recognizes the monetary and intrinsic value of managing technology (facilities, equipment, supplies) ☐ demonstrates effective techniques for managing facilities, equipment and supplies
Problem Solving and Innovation <ul style="list-style-type: none"> ☐ participates in problem solving as a process ☐ learns a range of problem-solving skills and approaches ☐ practices problem-solving skills by responding appropriately to a clearly defined problem, specified goals and constraints, by: <ul style="list-style-type: none"> – generating alternatives – evaluating alternatives – selecting appropriate alternative(s) – taking action 	<ul style="list-style-type: none"> ☐ identifies the problem and selects an appropriate problem-solving approach, responding appropriately to specified goals and constraints ☐ applies problem-solving skills to a directed or a self-directed activity, by: <ul style="list-style-type: none"> – generating alternatives – evaluating alternatives – selecting appropriate alternative(s) – taking action 	<ul style="list-style-type: none"> ☐ thinks critically and acts logically in the context of problem solving ☐ transfers problem-solving skills to real-life situations, by generating new possibilities ☐ prepares implementation plans ☐ recognizes risks 	<ul style="list-style-type: none"> ☐ identifies and resolves problems efficiently and effectively ☐ identifies and suggests new ideas to get the job done creatively, by: <ul style="list-style-type: none"> – combining ideas or information in new ways – making connections among seemingly unrelated ideas – seeking out opportunities in an active manner

Stage 1—The student:	Stage 2—The student:	Stage 3—The student:	Stage 4—The student:
Communicating Effectively <ul style="list-style-type: none"> ☐ uses communication skills; e.g., reading, writing, illustrating, speaking ☐ uses language in appropriate context ☐ listens to understand and learn ☐ demonstrates positive interpersonal skills in selected contexts 	<ul style="list-style-type: none"> ☐ communicates thoughts, feelings and ideas to justify or challenge a position, using written, oral and/or visual means ☐ uses technical language appropriately ☐ listens and responds to understand and learn ☐ demonstrates positive interpersonal skills in many contexts 	<ul style="list-style-type: none"> ☐ prepares and effectively presents accurate, concise, written, visual and/or oral reports providing reasoned arguments ☐ encourages, persuades, convinces or otherwise motivates individuals ☐ listens and responds to understand, learn and teach ☐ demonstrates positive interpersonal skills in most contexts 	<ul style="list-style-type: none"> ☐ negotiates effectively, by working toward an agreement that may involve exchanging specific resources or resolving divergent interests ☐ negotiates and works toward a consensus ☐ listens and responds to understand, learn, teach and evaluate ☐ promotes positive interpersonal skills among others
Working with Others <ul style="list-style-type: none"> ☐ fulfills responsibility in a group project ☐ works collaboratively in structured situations with peer members ☐ acknowledges the opinions and contributions of others in the group 	<ul style="list-style-type: none"> ☐ ☐ cooperates to achieve group results ☐ maintains a balance between speaking, listening and responding in group discussions ☐ respects the feelings and views of others 	<ul style="list-style-type: none"> ☐ seeks a team approach, as appropriate, based on group needs and benefits; e.g., idea potential, variety of strengths, sharing of workload ☐ works in a team or group: <ul style="list-style-type: none"> – encourages and supports team members – helps others in a positive manner – provides leadership/followership as required – negotiates and works toward consensus as required 	<ul style="list-style-type: none"> ☐ leads, where appropriate, mobilizing the group for high performance ☐ understands and works within the context of the group ☐ prepares, validates and implements plans that reveal new possibilities
Demonstrating Responsibility <p>Attendance</p> <ul style="list-style-type: none"> ☐ demonstrates responsibility in attendance, punctuality and task completion <p>Safety</p> <ul style="list-style-type: none"> ☐ follows personal and environmental health and safety procedures ☐ identifies immediate hazards and their impact on self, others and the environment ☐ follows appropriate/emergency response procedures <p>Ethics</p> <ul style="list-style-type: none"> ☐ makes personal judgements about whether or not certain behaviours/actions are right or wrong 	<ul style="list-style-type: none"> ☐ ☐ recognizes and follows personal and environmental health and safety procedures ☐ identifies immediate and potential hazards and their impact on self, others and the environment ☐ ☐ assesses how personal judgements affect other peer members and/or family; e.g., home and school 	<ul style="list-style-type: none"> ☐ ☐ establishes and follows personal and environmental health and safety procedures ☐ ☐ ☐ assesses the implications of personal/group actions within the broader community; e.g., workplace 	<ul style="list-style-type: none"> ☐ ☐ transfers and applies personal and environmental health and safety procedures to a variety of environments and situations ☐ ☐ ☐ demonstrates accountability for actions taken to address immediate and potential hazards ☐ analyzes the implications of personal/group actions within the global context ☐ states and defends a personal code of ethics as required
★Developmental Framework <ul style="list-style-type: none"> • Simple task • Structured environment • Directed learning 	<ul style="list-style-type: none"> • Task with limited variables • Less structured environment • Limited direction 	<ul style="list-style-type: none"> • Task with multiple variables • Flexible environment • Self-directed learning, seeking assistance as required 	<ul style="list-style-type: none"> • Complex task • Open environment • Self-directed/self-motivated

FORESTRY

B. STRAND RATIONALE AND PHILOSOPHY

Forests are a source of natural wealth and cover almost two-thirds of Alberta. The resources found on or beneath these public lands contribute to our economy and quality of life. Forested lands in Alberta and Canada provide wildlife habitats, vital watersheds, grazing lands, outdoor recreation and tourism opportunities, and support the development of the forest products industry.

Achieving harmony among the diverse and sometimes competing needs associated with forested lands is an important and continuing task. Through public involvement and a team approach, integrated resource management provides a process for achieving balanced use of forest resources.

Recently, global levels of public concern for forests has expanded to embrace practices that ensure sustainable use of forest ecosystems. Such sustainable use of resources and the environment today will not damage prospects for their continued use by future generations.*

Forestry, a strand in Career and Technology Studies, will provide opportunities for students to examine the dynamics of forest ecosystems, as well as the many benefits and opportunities associated with forests. Conservation is viewed throughout this strand as a process for managing human use of the forest environment to ensure such use is sustainable. Students will develop practical knowledge of industry practices that support the

integrated and sustainable development of forest resources.

Students in Forestry will develop the knowledge, skills, attitudes, motivation and commitment to work individually and collectively, as private citizens and members of the work force, toward the conservation and responsible use of water, land, air, forests and wildlife. Within the philosophy of Career and Technology Studies, *students* in Forestry will:

- develop greater awareness of the economic, environmental and social significance of the forest resource in Alberta and the rest of the world, and the benefits and costs of resource development

* Parks Canada and the Canadian Wildlife Service. *The Nature of Canada: A Primer on Spaces and Species*. Ottawa, ON: Environment Canada, 1993.

- describe relationships among production, processing and marketing systems within the forest products industry
- describe technologies and research programs designed to develop, conserve, protect, enhance and sustain the productivity of forested lands
- translate sustainable development and conservation goals into viable plans for managing use of the forest resource
- develop competencies and behaviours that have broad application to environmental career paths, and specific application to careers within Alberta's forest industries.

STRAND ORGANIZATION

DEVELOPMENT MODEL

The development model depicts three dimensions that provide a basis for selecting and organizing content within the Forestry strand.

- The **KNOWLEDGE, SKILLS AND ATTITUDES**, represented on the upper face of the model, provide structure for the course and focus attention on learning goals common to all CTS courses.
- The **LEARNING CONTEXTS**, represented on the right face of the model, foster the development of knowledge and behaviours that will enable students to meet the demands of daily living, further training and the workplace.

- The **THEMES** provide situational and concrete learning experiences that support the development of knowledge, skills and attitudes relevant to each of the learning contexts. Each theme focuses attention on the sustainable use of species and ecosystems. Blended together, the themes enable students to understand how it is possible to fulfill social, cultural, aesthetic and economic goals through resource development, while embracing a conservation ethic so as to maintain essential ecological process, genetic diversity and an adequate resource base for future generations.

LEVELS

Forestry, like other Career and Technology Studies curricula, is organized into three levels of learning: introductory, intermediate and advanced.

Introductory modules enable students to develop basic knowledge of forest regions and ecosystems, and skills necessary for functioning in a forest environment.

Intermediate and advanced level modules develop more specialized knowledge of silviculture practices, and the harvest, processing and marketing of forest products. Students examine forest management policies and programs, and begin to plan for the sustainable development of forested lands.

SCOPE AND SEQUENCE

FORESTRY

—— Prerequisite Recommended sequence

★ Course provides a strong foundation for further learning in this strand.

♦ Refer to specific courses for additional prerequisites.

† Course is also offered in Wildlife.

COURSE DESCRIPTIONS

Course FOR1010: Why Forestry?

Students explain the social, economic and environmental significance of forests, describe the impact of individuals on forests, and identify career opportunities in forestry.

Course FOR1020: Forest Regions of Canada

Students identify factors that determine the distribution of forests, as well as research forest regions of Canada with an emphasis on specific species and forest associations found in Alberta.

Course WLD1030: Outdoor Experiences 1 (Survival Skills)

Students demonstrate the basic skills required for responsible participation in a range of outdoor activities.

Course FOR1050: Mapping & Aerial Photos

Students interpret information from different types of maps and aerial photographs used in the forestry industry.

Course FOR1060: Measuring the Forest 1 (Measurement Skills)

Students demonstrate basic forest measurement skills, and apply these skills to sample fibre values in a forested region.

Course FOR1090: Forest Ecology 1 (Ecosystem Dynamics)

Students investigate forest ecosystems, and explain the structure and functioning of trees.

Course FOR1100: Forests Forever 1 (Forest Use & Protection)

Students describe past and present uses of Canada's forests, and explain how research and technology assist in forest management.

Course FOR2010: Making a Difference (Protection & Stewardship)

Students analyze the impact of attitudes, actions and lifestyles on forests, and propose individual and shared actions that foster environmental stewardship.

Course FOR2030: Managing Alberta Forests

Students research agencies and structures used to manage forested lands in Alberta.

Course WLD2030: Outdoor Experiences 2 (Wilderness Excursion)

Students plan, prepare for and conduct an extended outdoor wilderness trip.

Course FOR2060: Measuring the Forest 2 (Sampling Techniques)

Students research current forest inventory practices, and demonstrate appropriate strategies for sampling the fibre and nonfibre values of forests.

Course FOR2070: Harvest Practices (Fibre Harvest & Processing)

Students research the steps involved in harvesting and processing the forest fibre resource.

Course FOR2100: Forests Forever 2 (Management Practices)

Students explain Alberta's forest management goals, and describe the current management practices used to address these goals.

Course FOR2120: Users in the Forest

Students identify different forest users, and explain the planning principles used to develop an integrated resource management plan.

Course FOR3010: Issues in Forestry

Students analyze current local and global issues in forest management, and demonstrate individual and shared actions that foster environmental stewardship.

Course FOR3060: Measuring the Forest 3 (Survey Applications)

Students explain management applications of data collected from a forest survey, and examine the role of technology in current forest inventory practices.

Course FOR3070: The Forest Marketplace

Students describe the range of consumer products and services derived from Canada's forests, and research the production and marketing of these forest products.

Course FOR3080: Forest Technology Applications

Students examine research and technological applications in the forest industry, and examine changing career opportunities in the forestry sector.

Course FOR3090: Forest Ecology 2 (Silvics & Succession)

Students investigate the interrelationships among soil, water, air, trees and the environment, and explain how forests change over time as a result of these interrelationships.

Course FOR3110: Silviculture (Growing the Forest)

Students demonstrate knowledge of the techniques used to establish, grow and harvest tree crops.

Course FOR3120: Integrated Resource Management (Balancing Needs)

Students develop and present an integrated plan for sustainable development of the forest resource.

SECTION C: PLANNING FOR INSTRUCTION

CTS provides increased opportunity for junior and senior high schools to design courses based on the needs and interests of their students and the circumstances within the school and community. Some strands may be appropriately introduced at the junior high school level. Other strands are more appropriately introduced at the senior high school level or to Grade 9 students. Refer to this section for recommendations regarding the Forestry strand.

PLANNING FOR CTS

Defining Courses

Schools determine which strands and courses will be offered in a particular school, and may combine 1-credit CTS courses into multiple-credit CTS offerings.

Each 1-credit course was designed for approximately 25 hours of instruction. However, this time frame is only a guideline to facilitate planning. The CTS curricula are competency based, and the student may take more or less time to gain the designated competencies within each course.

A multiple-credit CTS offering will usually consist of 1-credit courses primarily from the same strand but, where appropriate, may include courses from other CTS strands. Refer to the *Guide to Education: ECS to Grade 12* (Appendix 1) for more information on course names and course codes.

Course selection and sequencing should consider:

- prerequisite(s)
- supporting courses (other CTS courses that may enhance the learning opportunity if offered with the course)
- course parameters:
 - instructional qualifications, if specialized
 - equipment and facility requirements, if specialized.

The course parameters are defined in Sections D, E and F of this Guide.

Degree of Flexibility

The CTS program, while designed using the modular structure to facilitate flexible timetabling and instructional delivery, does not mandate the degree of flexibility a school or teacher will offer. The teacher and school will determine the degree of flexibility available to the student. Within the instructional plan established by the school, the student may:

- be given the opportunity to progress at a rate that is personally challenging
- have increased opportunity to select the courses that develop competencies he or she finds most relevant.

Integrating Basic Competencies

The basic competencies relate to managing learning and resources, problem solving and innovation, communicating effectively, working with others and demonstrating responsibility are developed throughout the CTS program, and within each 1-credit course.

Assessment of student achievement on the basic competencies is integrated throughout the other general outcomes. Refer to Section G (Assessment Tools) of this Guide for the description of student behaviours expected at each of the four developmental stages defined for the basic competencies.

Assessment of basic competencies could include input and reflection involving the student, teacher(s), peers and others. Description of the observed behaviour could be provided through a competency profile for the course. Positive, ongoing interaction between the student and teacher will support motivation for student growth and improvement.

Assessing Student Achievement

Assessing student competency is a process of gathering information by way of observations of process, product and student interaction.

Where appropriate, assessment tools have been defined to assist the teacher and student in the assessment. Refer to Section G (Assessment Tools) of this Guide for copies of the various tools (worksheets, checklists, sample questions, etc.).

A suggested emphasis for each general outcome has also been established. The suggested emphasis provides a guideline to help teachers determine time allocation and/or the appropriate emphasis for each general outcome and the student grade.

Recognizing Student Achievement

At the high school level, successful demonstration of the exit-level competencies in a course qualifies the student for one credit. Refer to Section A of this Guide for more detailed information about how curriculum and assessment standards are defined in CTS. Refer to the *Career & Technology Studies Manual for Administrators, Counsellors and Teachers* for more information on how student achievement can be recognized and reported at the school and provincial levels.

Portfolio

When planning for instruction and assessment, consider a portfolio as an excellent tool to provide evidence of a student's effort, progress and achievement. Portfolios will aid students in identifying skills and interest. They also provide the receiving teacher, employer and/or post-secondary institution proof of a student's accomplishments. The make-up and evaluation of the portfolio should be a collaborative agreement between the student and teacher.

Resources

A comprehensive resource base, including print, software and audio-visual, has been identified to support CTS strands. It is intended that these resources form the basis of a resource centre, encouraging teachers and students to access a

wide selection of resources and other information sources throughout the learning process. Unless otherwise noted, these resources are considered to be suitable for both junior and senior high school students.

Refer to Section I (Learning Resource Guide) to obtain directions for accessing up-to-date information about learning resources that have been identified to support the delivery of CTS courses in this strand.

Sample Student Learning Guides

In addition to the resources, Sample Student Learning Guides are available (refer to Section J of this Guide). These samples, designed for individual student or small group use, provide an instructional plan for selected courses and include the following components:

- Why take this course?
- What are the entry-level competencies?
- What are the exit-level competencies?
- What resources may be accessed?
- What assignments/activities must be completed?
- What are the timelines?
- How will the final mark be calculated?

Sample Student Learning Guides have been developed for the following courses in Forestry:

- Forest Regions of Canada
- Forest Ecology 1.

PLANNING FOR FORESTRY

The following suggestions are provided to assist teachers and school and school system administrators as they plan to deliver courses in the Forestry strand.

Selecting Courses

The scope and sequence chart in Section B provides an overview of the Forestry courses, indicating prerequisites and theme areas. Brief descriptions of each of the courses follow the scope and sequence chart in Section B.

Course planning should take into consideration course sequences that link with both physical and human resources present in the school and community. Although not required, it is recommended that FOR1010: Why Forestry? be a prerequisite/corequisite to all multiple-credit offerings in the Forestry strand.

Forestry in Junior High

The introductory level courses may be offered at the junior high level. As each school and community will vary in terms of available resources, it is important to consider potential education partners prior to selecting course sequences.

The number of courses offered will vary according to time available throughout Grades 7, 8 and 9. Individual courses may be clustered and offered within a school year or over a span of a few years. Junior high students may not complete all the learner expectations for each course that is offered.

Two sample offerings based on introductory level courses are outlined below.

Sample A: 50 hours of instruction

EMPHASIS OF COURSE CLUSTER
Introduction to Forestry
COURSES OFFERED
FOR1010 Why Forestry? FOR1020 Forest Regions of Canada
RATIONALE/KEY LEARNINGS
Students examine the economic, environmental and social significance of forests, describe the impact of individuals on forests, and conduct research on forest regions of Canada.
This CTS offering complements the junior high science and social studies programs, and can be linked with other CTS strands including Tourism and Wildlife.

Sample B: 75 hours of instruction

EMPHASIS OF COURSE CLUSTER
Personal/Recreational Use of Forests
COURSES OFFERED
FOR1090 Forest Ecology 1 WLD1030 Outdoor Experiences 1 FOR2010 Making a Difference
RATIONALE/KEY LEARNINGS
Students investigate the structure and functioning of forest ecosystems, develop basic skills required for responsible participation in a range of outdoor forest activities, and propose individual and shared actions that foster environmental stewardship.
This CTS offering complements the junior high core science program and complementary Environmental and Outdoor Education program, and can be linked with other CTS strands including Tourism and Wildlife.

Where appropriate, junior high school students may also take intermediate level courses, particularly in the Technology and Applications theme.

Forestry in Senior High

All introductory, intermediate and advanced level courses may be offered to senior high students. Three sample multiple-credit CTS offerings, based on intermediate and advanced level courses and designed to be delivered to senior high school students, are outlined below.

Sample C: 75 hours of instruction

EMPHASIS OF MULTIPLE-CREDIT OFFERING
Forest Inventory (assuming junior high background)
1-CREDIT COURSES OFFERED
FOR2060 Measuring the Forest 2 FOR3060 Measuring the Forest 3 FOR3080 Forest Technology Applications
RATIONALE/KEY LEARNINGS
Students demonstrate appropriate strategies for sampling fibre and non-fibre values of the forest, explain management applications of data collected from a forest survey, and research applications of technology in forest inventory practices. This multiple-credit offering can be linked with other CTS strands including Agriculture, Career Transitions, Information Processing, Tourism and Wildlife.

Sample D: 100 hours of instruction

EMPHASIS OF MULTIPLE-CREDIT OFFERING
Silviculture and Forest Harvest (assuming junior high background)
1-CREDIT COURSES OFFERED
FOR3090 Forest Ecology 2 FOR3110 Silviculture FOR2070 Harvest Practices FOR3070 The Forest Marketplace
RATIONALE/KEY LEARNINGS
Students investigate relationships among soil, water, air, trees and the environment, demonstrate techniques in establishing, growing, harvesting and processing tree crops, and research the production and marketing of forest products in Canada. This multiple-credit offering can be linked with other CTS strands including Career Transitions, Management and Marketing, Mechanics and Wildlife.

Sample E: 125 hours of instruction

EMPHASIS OF MULTIPLE-CREDIT OFFERING
Forest Management (assuming junior high background)
1-CREDIT COURSES OFFERED
FOR2030 Managing Alberta Forests FOR2100 Forests Forever 2 FOR2120 Users in the Forest FOR3010 Issues in Forestry FOR3120 Integrated Resource Management
RATIONALE/KEY LEARNINGS
Students research the goals of forest management, and agencies/frameworks used to manage forested lands in Alberta. They focus attention on different users in the forest, the planning principles involved in integrated resource management, and individual/shared actions that foster environmental stewardship. This multiple-credit offering can be linked with other CTS strands including Agriculture, Career Transitions, Energy and Mines, Legal Studies, Tourism and Wildlife.

Courses could also be clustered into multiple-credit offerings that develop competencies relevant to career opportunities within a specific industry.

Organizing for Learning

A “learn by doing” approach is recommended for the Forestry strand. Essentially, the teacher’s role becomes that of guide and partner in the learning process. The “learn by doing” approach requires the teacher to be facilitator and coach, rather than subject-based expert, as students actively participate in learning by doing and discovering.

Small group instruction is a good way to foster learning by doing and discovering. Small groups enable students to be active participants in learning, and develop independent and responsible learning habits. As students work in small group situations they will share information, solve problems, develop consensus, and help each other learn content and processes.

The community has a key role in education and can be an effective partner in the learning process. The use of community members and resources should be integrated into course planning. Business, industry, post-secondary and government agencies offer a wide range of services and resources, as do local clubs, service groups and institutions. When planning for the use of community resources, teachers should ensure that related presentations and/or activities:

- are consistent with student knowledge and skill levels
- demonstrate sound pedagogy
- are exemplary of approved health and safety standards
- provide a balanced approach to curriculum topics and related issues.

Before selecting courses, teachers should refer to the course parameters outlined in Sections D, E and F of this Guide.

Individual 1-credit courses can be delivered sequentially, concurrently or combined. For example, although the courses in the Technology and Applications theme are sequential, they can be combined with courses from the Social and Cultural Perspectives theme or the Management and Conservation theme.

Scenario A

Scenario B

Teachers can also allow students to progress at a rate that is personally challenging; e.g.:

Scenario C

Scenario D

Plans for learning must address social, environmental and economic perspectives related to sustainable forest management and provide opportunities for students to become involved in learning experiences that reflect a broad understanding of issues related to forest use. Presentations of course content that reflect a singular or narrow view of social, economic or environmental concerns are not consistent with learner expectations and must be avoided.

As in all CTS strands, students will identify, explore and prepare for future career opportunities. It is recommended that instructional planning include the integration of relevant career investigations throughout each course, rather than as a singular or isolated study. Career profiles, interviews and job shadowing will acquaint students with the many technical and professional careers associated with the forest industry.

Instructional Qualifications

Responsibility for instructional planning and assessment of courses in Forestry will be assumed by Alberta certified teachers. A background in science and/or forest industry will be an asset to those who provide instruction in Forestry courses, particularly at the intermediate and advanced levels. Teachers may find it desirable to access sources of instructional support available from forest industry, professional forestry associations and consultants, and relevant government agencies (e.g., Alberta Environmental Protection).

To ensure compliance with safety and industry standards, some courses require that components of instruction be provided by person(s) having additional credentials granted by industry, government or community organizations. Forestry courses requiring additional instructor qualifications are identified in the following chart.

COURSE	ADDITIONAL INSTRUCTOR QUALIFICATIONS	
	Required	Recommended
WLD1030: Outdoor Experiences 1	Standard Level First Aid Certificate	First Aid in the Wilderness Certificate
FOR1060: Measuring the Forest 1	Standard Level First Aid Certificate	
WLD2030: Outdoor Experiences 2	Standard Level First Aid Certificate	First Aid in the Wilderness Certificate
FOR2060: Measuring the Forest 2	Standard Level First Aid Certificate	
FOR3090: Forest Ecology 2	Standard Level First Aid Certificate	

Refer to the corresponding course in Section D, E or F of this Guide for further information regarding each instructor qualification. In some instances it may be desirable to have other qualified individuals in the community work with the teacher in delivering courses (or parts thereof) that require additional instructor qualifications.

Sensitive Issues

Some Forestry courses contain topics of a sensitive nature. Teachers will need to be respectful of family and community values in selecting appropriate courses to offer in Forestry. For example, courses that reference the consumptive use of forests and examine different methods of forest harvest (i.e., FOR2070, FOR3070) may be sensitive in some communities.

Ethical issues surrounding the sustainable management of forests may also be sensitive for some students (i.e., FOR1100, FOR2100, FOR2120, FOR3010). Emphasis should be placed on a “process” for conflict analysis and not on particular positions that may be expressed.

For further clarification of provincial policy on sensitive issues, refer to the *Policy, Regulations and Forms Manual* (Controversial Issues in Education, Policy 1.7.1). Teachers and administrators should also review jurisdictional policies related to sensitive issues.

Health, Safety and Related Legislation

Facilities used to support a Forestry program must ensure a safe learning/working environment. Students must be aware of federal, provincial and local regulations governing the tasks they perform, and establish appropriate personal and environmental health and safety procedures for courses that involve:

- the use of specialized hand/power equipment
- the handling and storage of hazardous materials
- outdoor trips and field-based investigation.

Students must understand immediate and potential hazards associated with the tasks they perform, and the possible impact of these hazards on self, others and the environment.

Of particular significance from the perspective of health and safety are courses that involve outdoor trips in forest environments (e.g., WLD1030, WLD2030). These courses require that both student and instructor have prior knowledge of survival techniques and are able to provide first aid in remote locations.

For additional information on health and safety standards, refer to the *Career & Technology Studies Manual for Administrators, Counsellors and Teachers* (Appendix 3).

Addressing Safety in Off-Campus Excursions

Outdoor trips and field-based investigations are recommended and should be an important part of teaching and learning throughout the Forestry strand. Safety must be a prime consideration in planning off-campus learning experiences. Both teachers and students should engage in activities commensurate with their level of training and ability. Adequate instructional support, guidance and supervision must be provided at all times. Local jurisdiction and school policies must be understood by principals, teachers, parents, supervisors and students.

Preparation and Risk Anticipation

The preparation stage is an important part of any off-campus learning experience. At this stage of planning, potential risks can be anticipated and either avoided or moderated. The preparation stage should focus attention on:

- trip administration, including the use of parental permission forms, health information forms, school/system authorization forms and accident report forms as required
- a review of laws and regulations relevant to the learning site and activities that will be undertaken
- assessment of the learning site in terms of potential hazards and risks that may be present
- group size and the level of supervision that will be required (i.e., supervisor/student ratio)
- a briefing of parents, school administrators, government/industry authorities or others who should be informed regarding itineraries, participants and emergency response plans
- pre-trip logistics, including transportation, equipment, facility and departure date/time considerations
- student preparation, including the development of background knowledge/experience and training in specific skill areas.

On-Site Risk Management

Safety and risk management involves exercising situation-specific judgement throughout the course of off-campus learning. Judgement is the product of experience, and may include recognizing factors such as dangers imposed by equipment or animals, deteriorating weather, a decline in physical strength, or a more challenging task. Many of the hazard recognition skills can be taught in the classroom in the preparation stage.

A significant aspect of on-site risk management is group management. Teachers can exercise appropriate group management strategies by focusing attention on:

- pacing, including speed of travel, rest stops, distance travelled and fitness level of students
- maintaining a safe distance for observations

- group control, including position of leader, signal systems and buddy systems
- the establishment of group rules and norms
- clearly defined task allocations for each student
- objective hazard recognition in the field, including machinery and equipment, weather, terrain, flora and fauna
- subjective hazard recognition in the field, including level of group energy and level of cooperation.

Emergency Response

If students have been well prepared for field-based learning experiences and appropriate group management strategies exercised, the teacher will have maximized opportunities for effective response to an emergency situation. An effective emergency response action plan should include consideration of:

- a suitable approach to the accident site
- first-aid supplies and techniques
- a strategy for signalling assistance
- an evacuation plan
- group management throughout the emergency situation.

Identifying Linkages

Section H of this Guide describes linkages within CTS and with core and complementary programs.

In particular, teachers should be aware of the linkages of Forestry with biology components in the junior and senior high science program, and also with environmental components in the junior high Environmental and Outdoor Education Program. The Forestry strand is designed to reinforce, extend and apply related learnings in these courses. Collaborative planning at the school level will ensure meaningful learning experiences through effective integration of these courses.

The Career Transitions strand of CTS provides project, practicum, safety and leadership courses that may be combined with courses in Forestry to

increase opportunity for students to develop expertise, refine their competencies and/or obtain credentials.

Using “Project” Courses

Students may use one or more of the 10 project courses to expand learning beyond the competencies outlined in particular Forestry courses. For example, a silviculture or forest inventory project may require more than the 25, 50 or 75 hours available through courses by that name. In these instances, project courses from the Career Transitions strand may be accessed so as to provide sufficient time for completion of learning and the task. For each project course, the teacher and student establish specific learning outcomes, assessment criteria, resources and timelines.

Using “Practicum” Courses

Students may use one or more of the four practicum courses to extend the competencies developed in particular Forestry courses in order to attain a recognized credential offered by an agency external to the school. For example, students who plan to work in the forest industry may wish to access a practicum course from the Career Transitions strand in order to obtain a “Bear Awareness and Avoidance” certificate. Practicum courses must be supervised by both a qualified teacher and an experienced professional authorized to supervise trainees for the credential.

Project and practicum courses are **not** designed to be offered as isolated courses and should **not** be used to extend Work Experience 15, 25 and 35 courses.

Improving Smooth Transitions to the Workplace and/or Post-secondary Programs

Refer to Section H of this Guide for potential transitions students may make into:

- the workplace
- related post-secondary programs or other avenues for further learning.

COURSE CURRICULUM AND ASSESSMENT STANDARDS:

SECTION D: INTRODUCTORY LEVEL

The following pages define the curriculum and assessment standards for the introductory level of Forestry.

Introductory level courses help students build daily living skills and form the basis for further learning. Introductory courses are developed for students who have no previous experience in the strand.

General outcomes define the competencies a student must demonstrate to achieve success in a course. Assessment standards define the criteria and conditions to be used for assessing the competencies defined in the general outcomes.

Specific outcomes provide a detailed framework for instruction to help students build the competencies defined in the general outcomes. Additional information and suggestions for instruction are provided in the Notes column; teachers may wish to use this space to record their ideas for instruction or student projects.

Course FOR1010:	Why Forestry?.....	D.3
Course FOR1020:	Forest Regions of Canada	D.7
Course WLD1030:	Outdoor Experiences 1 (Survival Skills)	D.11
Course FOR1050:	Mapping & Aerial Photos	D.17
Course FOR1060:	Measuring the Forest 1 (Measurement Skills).....	D.23
Course FOR1090:	Forest Ecology 1 (Ecosystem Dynamics)	D.27
Course FOR1100:	Forests Forever 1 (Forest Use & Protection).....	D.31

MODULE FOR1010: WHY FORESTRY?

Level: Introductory

Theme: Social and Cultural Perspectives

Prerequisite: None

Module Description: Students explain the social, economic and environmental significance of forests, describe the impact of individuals on forests, and identify career opportunities in forestry.

Module Parameters: Access to relevant government, industry and community resources.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none">describe the social, economic and environmental significance of forests	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none">identifying and explaining six or more ways in which local forests (regional or provincial) have:<ul style="list-style-type: none">social and cultural significance (e.g., recreational, spiritual, aesthetic, medicinal)economic significance (e.g., employment, product export, tourism, subsistence, tax base)environmental significance (e.g., air, water and soil cycles). <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Significance of Forests, FOR1010-1</i> <i>Sample Timeline: Forestry in North America, FOR1010-2</i></p> <p><i>Standard</i> <i>Respond to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none">a comprehensive list of forest products and services. <p><i>Standard</i> <i>Identify and describe 20 products and 10 services derived from Canadian forests</i></p>	40

MODULE FOR1010: WHY FORESTRY? (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> explain how personal needs, wants, beliefs and actions may influence the forest resource 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> completing a research project that examines influences of personal needs, wants, beliefs and actions on the forest resource. Research to address the influences of: <ul style="list-style-type: none"> consumer choices recreational patterns product marketing and promotion environmentally friendly products conservation and preservation ethics. <p><i>Assessment Tool</i> <i>Research Process: Impacts on the Forest Resource, FOR1010-3</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> maintaining a log/journal of reflections and thoughts regarding the impact of personal attitudes, actions and lifestyle on the forest resource, and ideas for environmental citizenship. <p><i>Assessment Tool</i> <i>Reflection Guide for Environmental Responsibility/Citizenship, FORREF-ENV</i></p> <p><i>Standard</i> <i>Complete five journal/log entries; address criteria for reflection to a standard of 1 on the rating scale</i></p>	30
<ul style="list-style-type: none"> identify career opportunities relevant to forestry 	<ul style="list-style-type: none"> given current information on career opportunities in forestry, completing a research project on one or more occupations in the forestry sector. <p><i>Assessment Tool</i> <i>Career Search: Introductory Level, FORCAR-1</i></p> <p><i>Standard</i> <i>Conduct research to a standard of 1 on the rating scale</i></p>	30
<ul style="list-style-type: none"> demonstrate basic competencies. 	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

MODULE FOR1010: WHY FORESTRY? (continued)

Concept	Specific Learner Expectations	Notes
Forest Role	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • present a historical perspective on the social and cultural significance of forests; e.g.: <ul style="list-style-type: none"> – recreational – spiritual/aesthetic – medicinal – community dependence • describe the economic significance of forests at local, national and global levels; e.g.: <ul style="list-style-type: none"> – direct and indirect employment – forest products and export values – tourism – subsistence – tax base • describe the environmental significance of forests at local, national and global levels; e.g.: <ul style="list-style-type: none"> – wildlife and fisheries habitat – watershed protection and maintenance – water, air and soil quality – maintenance of ecosystems – climate change. 	<p>Interview people for whom the forest has historical significance (e.g., senior citizens, aboriginal groups).</p> <p>Monitor the performance of forest industry in the stock market.</p> <p>Interview local industry representatives.</p> <p>Visit a local sawmill.</p> <p>Contact the Canadian Forestry Service (Natural Resources Canada) for current resource materials (see Section I: Learning Resource Guide).</p> <p>See <i>Alberta's Focus on Forests</i> (Activity 4.2–Products From Canadian Forests).</p>
Personal Impact	<ul style="list-style-type: none"> • describe the impact of individual attitudes, actions and lifestyle on the forest resource; e.g.: <ul style="list-style-type: none"> – conservation ethic – preservation ethic – consumer practices – recreational patterns • describe how consumer and marketing trends in society may affect the forest resource; e.g.: <ul style="list-style-type: none"> – needs versus wants – media exaggeration – use of environmental friendly products 	<p>Conduct interviews with foresters, ranchers, environmentalists, etc. Summarize their views regarding conservation, preservation and sustainable management of forests.</p> <p>Prepare an inventory of household materials used each day. How many of these materials are derived from the forest resource?</p> <p>Distinguish between wants and needs. Analyze the impact of television advertisements.</p>

MODULE FOR1010: WHY FORESTRY? (continued)

Concept	Specific Learner Expectations	Notes
Personal Impact (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> propose personal strategies for using forests wisely that foster the attainment of social, cultural, economic and environmental goals; e.g.: <ul style="list-style-type: none"> personal actions leadership roles. 	<p>Analyze and debate a controversial issue.</p> <p>Contact the Environmental Law Centre for resources that support issue analysis and conflict resolution.</p> <p>Plan and implement a paper recycling project at home and/or school.</p>
Career Opportunities	<ul style="list-style-type: none"> research potential careers and the range of occupational opportunities within the forestry sector: <ul style="list-style-type: none"> professional technical labour-based describe employment statistics within one or more areas of specialization; e.g., <ul style="list-style-type: none"> types of careers number of workers employment trends infer career opportunities and trends from employment statistics infer impacts of the marketplace on employment opportunities predict possible forest industries in the future, and resulting career opportunities. 	<p>Interview people employed in the forestry sector. Identify general areas of specialization; e.g.:</p> <ul style="list-style-type: none"> resource inventory biology/ecology resource protection resource harvest forest products environmental management recreation education. <p>Review National Occupational Profiles (NOC).</p> <p>Contact the "Career Hotline" (telephone 1-800-661-3753).</p> <p>Contact senior management people in the forest industry; also producers of value-added products.</p>

MODULE FOR1020: FOREST REGIONS OF CANADA

Level: Introductory

Theme: Social and Cultural Perspectives

Prerequisite: None

Module Description: Students identify factors that determine the distribution of forests, as well as research forest regions of Canada with an emphasis on specific species and forest associations found in Alberta.

Module Parameters: Access to relevant government and library resources.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<i>The student will:</i> <ul style="list-style-type: none">identify factors that determine the type and distribution of forests	<i>Assessment of student assessment will be based on:</i> <ul style="list-style-type: none">conducting laboratory and/or field investigations to determine the effect of temperature, moisture or soil on plant growth. <i>Assessment Tool</i> <i>Lab Investigations: Factors Affecting Plant Growth, FOR1020-1</i> <i>Standard</i> <i>Complete lab and/or field investigations to a standard of 1 on the rating scale</i>	20
	<ul style="list-style-type: none">explaining ways in which climate and land form affect the growth and distribution of forests. <i>Assessment Tool</i> <i>Knowledge/Application Assessment: Growth and Distribution of Forests, FOR1020-2</i> <i>Standard</i> <i>Respond to a standard of 1 on the rating scale</i>	10
	<ul style="list-style-type: none">locate and describe the forest regions of Canada<ul style="list-style-type: none">given outline maps of Canada and Alberta, locating and describing:<ul style="list-style-type: none">the eight forest regions of Canada and major tree species within each regionthe three forest regions present in Alberta and major tree species within each region. <i>Assessment Tool</i> <i>Task Checklist for Mapping, FORMAP</i> <i>Standard</i> <i>Complete applicable mapping tasks to a standard of 1 on the rating scale</i>	30

MODULE FOR1020: FOREST REGIONS OF CANADA (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> identify and describe trees that grow in specific regions of Canada and Alberta 	<p><i>Assessment of student assessment will be based on:</i></p> <ul style="list-style-type: none"> given access to actual (or photographed) tree, shrub and/or plant species within a forest region of Canada, preparing (following museum conservation rules) a leaf or twig collection including at least 20 native species. Each species to be identified using common and scientific names. (At least 50% of the species identified and collected to be trees. If photographs are used in place of actual specimens, collection to include both closeup and full-view photos of each species.) <p><i>Assessment Tool</i> <i>Museum Conservation Rules for Leaf/Twig Collection, FOR1020-3</i></p> <p><i>Standard</i> <i>Prepare each specimen in the collection to a standard of 2 on the rating scale</i></p>	40
<ul style="list-style-type: none"> demonstrate basic competencies. 	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above.</i></p>	Integrated throughout

Concept	Specific Learner Expectations	Notes
Determining Factors	<p><i>The student should:</i></p> <ul style="list-style-type: none"> identify factors that enhance the development of forests and determine the distribution of living organisms within forest regions; e.g.: <ul style="list-style-type: none"> land form climate describe relationships between climatic factors and the growth of trees; e.g.: <ul style="list-style-type: none"> temperature moisture 	<p>Consider concurrent delivery of this module with FOR1090: Forest Ecology 1.</p> <p>Conduct a laboratory investigation that examines the effects of moisture on tree growth.</p>

MODULE FOR1020: FOREST REGIONS OF CANADA (continued)

Concept	Specific Learner Expectations	Notes
Determining Factors (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe relationships between land forms and the distribution of forests; e.g.: <ul style="list-style-type: none"> topography soil conditions identify reasons for the distribution of trees in natural regions in Canada and Alberta. 	Identify concentrations of particular tree species on a map of a local area. Suggest reasons for the distributions noted.
Forest Regions	<ul style="list-style-type: none"> locate and describe the eight forest regions of Canada; e.g.: <ul style="list-style-type: none"> Boreal Subalpine Montane Coast Columbia Deciduous Great Lakes/St. Lawrence Acadian read, interpret and create visual representations of species distribution in Canada and Alberta. 	<p>See <i>Alberta's Focus on Forests</i> (Activity 4.1– Trees of Alberta and Canada).</p> <p>Obtain the <i>Forest Regions of Canada</i> poster series (Canadian Forestry Service) and the <i>Natural Regions of Alberta</i> poster series (Alberta Environmental Protection).</p> <p>Match common trees with their respective locations.</p> <p>Discuss Alberta's six natural regions.</p> <p>Provide relevant mapping exercises.</p>
Tree Identification	<ul style="list-style-type: none"> identify common trees and other plants that grow in specific regions of Canada and Alberta; e.g.: <ul style="list-style-type: none"> tree and shrub identification non-woody plant identification prepare a display of details that help to identify local trees, shrubs and non-woody plants; e.g.: <ul style="list-style-type: none"> leaves flowers/cones twigs bark. 	<p>Field trips will provide opportunities for “on-site” tree location/ identification.</p> <p>Use appropriate identification keys to assist in identifying tree species.</p> <p>Gather and prepare leaf and twig collections.</p>

COURSE WLD1030: OUTDOOR EXPERIENCES 1 (SURVIVAL SKILLS)

Level: Introductory

Theme: Social and Cultural Perspectives

Prerequisite: Emergency First Aid (current certification)

Description: Students demonstrate the basic skills required for responsible participation in a range of outdoor activities.

Parameters: Access to an outdoor wilderness environment (e.g., one of Alberta's six natural regions) and gear for outdoor expeditions.

Instructor training (current certification) in Standard Level First Aid is required; instructor training in First Aid in the Wilderness is recommended.

Teachers may find it desirable to access the services of a qualified Outdoor Guide in delivering components of this course.

Off-campus learning activities must be commensurate with previous levels of wilderness training and experience; day trips should precede extended overnight trips; experience in hardcover camping should precede potential softcover camping and/or emergency shelter camping opportunities.

Note: Specific outcomes in Outdoor Experiences 1 and 2 link with the *National Occupational Standards for Outdoor Guide* (Alberta Tourism Education Council), and address core skills in Environmental Awareness, Camp and/or Trip Operation, Safety and Survival.

See Section C (Planning for Instruction) and Section H (Linkages/Transitions) of this Guide for further information on instructor training/certification and linkages.

Supporting Course: CTR1210 Personal Safety (Management)

Because of the practical nature of this course, students must have a general knowledge of basic first-aid and survival techniques relevant to wilderness environments. See Planning for Instruction in Section C for further information on student safety.

Note: WLD1030 and WLD2030 (Outdoor Experiences 1 and 2) provide opportunities for wilderness interaction at a personal level. This course sequence should place emphasis on developing skills that will enable students to safely observe and appreciate wildlife and habitat within one or more of Alberta's six natural regions.

COURSE WLD1030: OUTDOOR EXPERIENCES 1 (SURVIVAL SKILLS) (continued)

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate knowledge and skills necessary for responsible outdoor experiences 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> a teacher-prepared assessment in which the student demonstrates knowledge of "Safety," "Survival" and "Environmental Impact" as outlined in the <i>National Occupational Standards for Outdoor Guide</i>. Assessment to address: <ul style="list-style-type: none"> safety guidelines survival techniques ecotourism and carrying capacity. <p><i>Assessment Tool</i> <i>Sample Assessment Items: Outdoor Experiences 1, WLD1030-1</i></p> <p><i>Standard</i> <i>Response indicating 80% mastery</i></p>	20
<ul style="list-style-type: none"> conduct safe outdoor activities that have minimal environmental impact 	<ul style="list-style-type: none"> within a continuous timeframe of 20 or more hours, and through access to an outdoor environment, conducting safe outdoor activities that have minimal impact on the environment. The student will demonstrate appropriate procedures for: <ul style="list-style-type: none"> travel in outdoor environments observation of flora and fauna minimum impact/no-trace land use setting up emergency shelter signalling for help. <p><i>Assessment Tool</i> <i>Task Checklist: Outdoor Experiences 1, WLD1030-2</i> <i>Lab Assessment: Outdoor Forest Experiences, FORLAB</i></p> <p><i>Standard</i> <i>Achieve a performance rating of 2 in task assessment <u>and</u> lab assessment</i></p>	80

COURSE WLD1030: OUTDOOR EXPERIENCES 1 (SURVIVAL SKILLS) (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> maintaining a log/journal of outdoor experiences that provides summative reflection on: <ul style="list-style-type: none"> individual and group preparedness, cooperation and responsibility observations of wildlife and habitat environmental ethics. <p><i>Assessment Tool</i> <i>Reflection Guide for Outdoor Experiences, FORREF-OUT</i></p> <p><i>Standard</i> <i>Complete five log/journal entries; address criteria for reflection to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

Concept	Specific Outcomes	Notes
Wilderness Experience	<p><i>The student should:</i></p> <ul style="list-style-type: none"> identify, assess, avoid and/or respond to physical hazards that may be imposed by the natural environment; e.g.: <ul style="list-style-type: none"> particular terrain and conditions, including avalanche, rock slides, lake and river ice, and bush travel wildlife that may be encountered, including bears, bees, ticks, nonedible plants, snakes changes in weather conditions that may affect personal and group safety identify, assess, avoid and/or respond to physiological and psychological factors often associated with outdoor experiences; e.g., <ul style="list-style-type: none"> dealing with hypothermia, frostbite, dehydration and heat stroke understanding fatigue and when not to move coping with adversities, such as getting lost or hurt 	<p>Student safety must be a prime consideration in selecting learning activities within this course. Activities must be consistent with student knowledge and skill levels.</p> <p>Investigate hazards pertinent to a particular activity. View films and slide shows of outdoor activities that involve physical hazards.</p> <p>Invite guest speakers to present information and advice on expeditions.</p>

COURSE WLD1030: OUTDOOR EXPERIENCES 1 (SURVIVAL SKILLS) (continued)

Concept	Specific Outcomes	Notes
Wilderness Experience (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> list and explain necessary steps to take in emergency and survival situations in the outdoors; e.g.: <ul style="list-style-type: none"> what to do if lost or separated from the group first aid and emergency response to injury construction of emergency shelters how to gather food from edible plants en route organizational strategies, including lead and sweep, regrouping procedures, pacing select appropriate personal and group gear for outdoor activities; e.g.: <ul style="list-style-type: none"> personal gear, with consideration to maintaining body temperature and protection from injury group gear, to meet requirements for food, shelter, travel and emergencies demonstrate safe use and appropriate care of outdoor hand tools, including knives, axes and saws demonstrate safe procedures for building and using outdoor fires; e.g.: <ul style="list-style-type: none"> signalling warming cooking explain techniques used to plan, pack, carry and prepare foods during outdoor expeditions; e.g.: <ul style="list-style-type: none"> nutritional requirements portability and preservation factors food preparation techniques safe use of campfires explain techniques that can be used to maintain hygiene during outdoor expeditions; e.g.: <ul style="list-style-type: none"> water purification systems food storage personal health 	<p>Engage students in simulation activities, role playing and case studies.</p> <p>Review basic first aid and immerse students in emergency response situations.</p> <p>Have students present a “fashion show” or produce a video that demonstrates appropriate equipment and its use.</p> <p>Conduct maintenance clinic.</p> <p>Demonstrate techniques — then plan and carry out a schoolyard “cookout.”</p> <p>Involve students in menu planning for a hypothetical or proposed field trip.</p> <p>Invite guest speakers from a health department or from national/provincial parks.</p>

COURSE WLD1030: OUTDOOR EXPERIENCES 1 (SURVIVAL SKILLS) (continued)

Concept	Specific Outcomes	Notes
Wilderness Experience (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> explain techniques for minimum impact/no-trace land use; e.g.: <ul style="list-style-type: none"> guidelines for camping, controlling garbage, using water supply, using open fires and disposing of human waste protection of flora and fauna. 	<p>Discuss principles of “ecotourism.” Consider carrying capacity of a local area in relation to minimum environmental impact.</p> <p>Cite examples of careers in tourism (e.g., outdoor guide, fishing guide) that promote minimum impact land use.</p>
Outdoor Travel	<ul style="list-style-type: none"> plan and conduct safe outdoor expeditions in the natural environment; e.g.: <ul style="list-style-type: none"> research information from a variety of sources, including maps, aerial photographs, guidebooks, journals and local experts interpret route information by selecting reasonable destinations, estimating travel time and anticipating obstacles apply knowledge and skills while en route, including map reading and compass skills, knowledge of terrain and route selection, and mapping of key landmarks and directions use appropriate modes of travel to safely participate in outdoor activities; e.g.: <ul style="list-style-type: none"> hiking/backpacking cross-country skiing snowshoeing canoeing demonstrate safe and unobtrusive techniques to examine wildlife and habitat; e.g.: <ul style="list-style-type: none"> plant/animal identification wildlife hazards animal tracks and scat animal behaviour/social patterns 	<p>Examine maps, research books and reference materials on particular field sites to be visited.</p> <p>Assess alternative routes with regard to time and preparation required for each.</p> <p>Conduct map reading and basic orienteering exercises in school yard.</p> <p>Plan and implement a sequence of skill development activities with a follow-up excursion.</p> <p>Develop appropriate observation techniques; practise observing students in a library, animals in the zoo, etc.</p> <p>Reference the activities and suggestions provided in <i>The Art of Seeing and Tracking</i>.</p> <p>Make plaster casts of animal tracks.</p> <p>Examine furs, skulls, bones, nests, etc.</p>

COURSE WLD1030: OUTDOOR EXPERIENCES 1 (SURVIVAL SKILLS) (continued)

Concept	Specific Outcomes	Notes
Outdoor Travel (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none">• demonstrate minimum impact/no-trace land use while participating in outdoor expeditions; e.g.:<ul style="list-style-type: none">– proper trail use, including the avoidance of trail widening– campsite care, including the use of fires and stoves, tent site selection and firewood selection– waste disposal techniques, including latrines, waste water disposal and garbage.	<p>Observe human impacts on a wilderness area.</p> <p>Set up a model campsite in the school yard or a local park; practise minimum impact/no-trace land use.</p>

MODULE FOR1050: MAPPING & AERIAL PHOTOS

Level: Introductory

Theme: Technology and Applications

Prerequisite: None

Module Description: Students interpret information from different types of maps and aerial photographs used in the forestry industry.

Module Parameters: Access to forest maps and aerial photographs.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<i>The student will:</i> <ul style="list-style-type: none">describe different types of maps and aerial photographs used in forestry	<i>Assessment of student achievement should be based on:</i> <ul style="list-style-type: none">preparing and presenting a portfolio that includes:<ul style="list-style-type: none">four or more different types of maps used in forestry, and explanations of the characteristics and applications of eacha one-page report on the National Topographic Grid System and its application in providing legal land descriptionsthe results of research conducted on the goals and techniques of aerial photography. <i>Assessment Tool</i> <i>Portfolio Assessment: Maps Used in Forestry, FOR1050-1</i> <i>Standard</i> <i>Complete all portfolio components to a standard of 1 on the rating scale</i>	20
<ul style="list-style-type: none">interpret and apply information from maps and aerial photographs	<ul style="list-style-type: none">performing practical orienteering tasks that involve the use of information conveyed through maps. Tasks to include:<ul style="list-style-type: none">orienting a map through inspection of surroundings and use of a compassobtaining bearings from a map using a compassmeasuring direction using a Douglas protractorgiven a legal land description, locating the parcel of land on a map. <i>Assessment Tool</i> <i>Task Checklist: Orienteering, FOR1050-2</i> <i>Lab Assessment: Outdoor Forest Experiences, FORLAB</i> <i>Standard</i> <i>Achieve a performance rating of 1 in task assessment <u>and</u> lab assessment</i>	50

MODULE FOR1050: MAPPING & AERIAL PHOTOS (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate procedures used to create maps identify careers in the forest industry relevant to mapping and aerial photography demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> describing topography and forest cover for a given area based on information gathered from: <ul style="list-style-type: none"> an aerial photograph and corresponding parts of a forest type map two or more different types of aerial photographs (e.g., black and white, colour, infrared, satellite imagery). <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Reading and Interpreting Forest Maps, FOR1050-3</i></p> <p><i>Standard</i> <i>Respond to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> constructing a simple map that represents a local forested area. Map to display scale, legend, major land and forest features and topography. <p><i>Assessment Tool</i> <i>Task Checklist for Mapping, FORMAP</i></p> <p><i>Standard</i> <i>Complete applicable mapping tasks to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> given current information on career opportunities in mapping and aerial photography, completing a research project on one or more related occupations. <p><i>Assessment Tool</i> <i>Career Search: Introductory Level, FORCAR-1</i></p> <p><i>Standard</i> <i>Conduct research to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>20</p> <p>10</p> <p>Integrated throughout</p>

MODULE FOR1050: MAPPING & AERIAL PHOTOS (continued)

Concept	Specific Learner Expectations	Notes
Applications of Maps and Aerial Photographs	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe different types of maps used in forestry; e.g.: <ul style="list-style-type: none"> base maps topographic/contour maps soil type maps forest stand or type maps describe components and applications of the National Topographic Grid System and the Western Grid Survey System explain the purpose and techniques of aerial photography describe applications of different types of film used in aerial photography; e.g.: <ul style="list-style-type: none"> black and white black and white infrared colour colour infrared describe information-gathering technologies and their applications in mapping; e.g.: <ul style="list-style-type: none"> satellite imagery global positioning systems (GPS) geographic information systems (GIS). 	<p>Contact the Canadian Forestry Service (Natural Resources Canada) or local forest industry to request different types of maps used in forestry.</p> <p>Obtain maps and photos of locally known areas from Alberta Environmental Protection.</p> <p>See related topics and resources in the Agriculture strand (AGR3120: Soils Management 2).</p> <p>Contact industry and/or government resource persons.</p> <p>See "JFW Green Tree Trailblazer Leader Manual," <i>Woodstravel</i>, pp. 117–216).</p> <p>Contact RADARSAT International (3851 Shell Road, Suite 200, Richmond, British Columbia) for current information regarding applications of satellite remote sensing in mapping Canada's forest resources.</p>

MODULE FOR1050: MAPPING & AERIAL PHOTOS (continued)

Concept	Specific Learner Expectations	Notes
Interpreting Maps and Aerial Photographs	<p><i>The student should:</i></p> <ul style="list-style-type: none"> orient forestry maps through: <ul style="list-style-type: none"> inspection use of a compass identify bearings from a map using a forestry compass calculate direction using a Douglas protractor read and interpret maps and aerial photographs, explaining information conveyed through: <ul style="list-style-type: none"> legend and symbols scale colours contour lines locate a specific parcel of land on a map by using its legal survey description describe land terrain from information conveyed through maps estimate and calculate distance and area on maps demonstrate applications of aerial photographs in the stereoscopic viewing of topographic features compare details of forest type maps and aerial photographs with existing ground conditions. 	<p>Read and interpret maps/photos of locally known areas.</p> <p>See map interpretation activities provided in:</p> <ul style="list-style-type: none"> <i>Orienteering, Level I</i> <i>Orienteering, Level II.</i> <p>Develop a series of mapping activities—start with locating dots in the classroom, then markers around the school, and finally markers around a park or wooded area.</p> <p>See related topics and resources in the Agriculture strand (AGR3120: Soils Management 2).</p> <p>Consider links with the mathematics program:</p> <ul style="list-style-type: none"> scale diagrams ratio and proportion estimation. <p>Discuss the theory behind stereoscopic vision and techniques used to train the eye.</p>
Making Maps	<ul style="list-style-type: none"> construct a map that provides information about a forested area; e.g.: <ul style="list-style-type: none"> pace/measure area to be mapped gather information regarding land/forest features determine map scale prepare a legend plot major land/forest features 	<p>Create a simple topographical map of a local area.</p>

MODULE FOR1050: MAPPING & AERIAL PHOTOS (continued)

Concept	Specific Learner Expectations	Notes
Making Maps (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • explain how information from aerial photographs is used to construct two-dimensional maps • compare details of an aerial photograph with corresponding parts of a forest type map. 	<p>Use aerial photographs to create a simple map.</p> <p>If time permits, create a photo mosaic by arranging consecutive aerial photographs along a flight path.</p>
Career Opportunities	<ul style="list-style-type: none"> • research potential careers and the range of occupational opportunities in mapping and aerial photography: <ul style="list-style-type: none"> – professional – technical – labour-based • describe employment statistics within one or more areas of specialization; e.g.: <ul style="list-style-type: none"> – types of careers – number of workers – employment trends • infer career opportunities and trends from employment statistics • infer impacts of technology development on employment opportunities • predict future information-gathering techniques likely to be used in the forest industry, and resulting career opportunities. 	<p>Interview people employed in careers that involve mapping and aerial photography. Identify some general areas of specialization.</p> <p>Review National Occupational Profiles (NOC).</p> <p>Contact the “Career Hotline” (telephone 1-800-661-3753).</p> <p>Contact senior management people in the forest industry; also users of information-gathering technologies (e.g., GPS, GIS).</p>

MODULE FOR1060: MEASURING THE FOREST 1 (MEASUREMENT SKILLS)

Level: Introductory

Theme: Technology and Applications

Prerequisites: FOR1050 Mapping & Aerial Photos
Emergency First Aid (current certification)

Module Description: Students demonstrate basic forest measurement skills, and apply these skills to sample fibre values in a forested region.

Module Parameters: Access to a demonstration forest and forest measurement tools.

Instructor training (current certification) in Standard Level First Aid is required.

See Section C (Planning for Instruction) and Section H (Linkages/Transitions) for further information on instructor training and certification.

Supporting Module: CTR1210 Personal Safety (Management) [Career Transitions Strand]

Because of the practical nature of this module, students must have a general knowledge of basic first-aid and survival techniques relevant to forest environments. See Planning for Instruction in Section C for further information on student safety.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none">explain the goals and techniques of conducting forest surveys	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none">completing a research project on the goals and techniques of conducting a forest survey. Research to address:<ul style="list-style-type: none">reasons for conducting forest surveystechniques used to sample a forested areahow sample data is used to estimate forest populations. <p><i>Assessment Tool</i> <i>Research Process: Forest Surveys, FOR1060–1</i></p> <p><i>Standard</i> <i>Conduct research to a standard of 1 on the rating scale</i></p>	10

MODULE FOR1060: MEASURING THE FOREST 1 (MEASUREMENT SKILLS) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic compass and measurement skills used in forest inventory practices 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> using a compass in the outdoors to orient a map, obtain a bearing, and perform a closed traverse (error in closure no greater than 5% of perimeter distance). <p><i>Assessment Tool</i> <i>Task Checklist: Orienteering, FOR1060–2</i> <i>Lab Assessment: Outdoor Forest Experiences, FORLAB</i></p> <p><i>Standard</i> <i>Achieve a performance rating of 1 in task assessment <u>and</u> lab assessment</i></p> <ul style="list-style-type: none"> given access to a plot of forested land, measuring chain, diameter tape, clinometer and increment borer, measuring (accurate to within 5%): <ul style="list-style-type: none"> horizontal distances up to 25 metres the diameter of 10 trees the height of 10 trees the age of 10 trees. <p><i>Assessment Tool</i> <i>Task Checklist: Forest Measurement, FOR1060–3</i> <i>Lab Assessment: Outdoor Forest Experiences, FORLAB</i></p> <p><i>Standard</i> <i>Achieve a performance rating of 1 in task assessment <u>and</u> lab assessment</i></p>	<p>70</p>
<ul style="list-style-type: none"> gather sample data regarding fibre volumes in a forested region 	<ul style="list-style-type: none"> given access to a plot of forested land and suitable measurement tools, conducting (with assistance) a survey of fibre values in the region by: <ul style="list-style-type: none"> establishing boundaries for a sample plot measuring tree diameter, height and age within the plot estimating fibre volumes from sample data. <p><i>Assessment Tool</i> <i>Task Checklist: Forest Survey, FOR1060–4</i> <i>Lab Assessment: Outdoor Forest Experiences, FORLAB</i></p> <p><i>Standard</i> <i>Achieve a performance rating of 1 in task assessment <u>and</u> lab assessment</i></p>	<p>20</p>

MODULE FOR1060: MEASURING THE FOREST 1 (MEASUREMENT SKILLS) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above.</i></p>	<p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
Forest Surveys	<p><i>The student should:</i></p> <ul style="list-style-type: none"> identify reasons for conducting a forest survey; e.g.: <ul style="list-style-type: none"> types of information gathered questions that are answered distinguish between forest samples and forest populations describe basic techniques used to sample a forested area; e.g.: <ul style="list-style-type: none"> layout of sample plots data collection techniques explain how sample data may be used to estimate fibre volumes and other nonfibre forest resources. 	<p>Invite resource persons from government, industry and/or professional associations.</p> <p>See <i>Alberta's Focus on Forests</i> (Activity 4.3—Surveying the Forest Resource).</p>
Compass and Measurement Skills	<ul style="list-style-type: none"> demonstrate basic compass skills to establish direction in the forest; e.g.: <ul style="list-style-type: none"> orient a map establish and follow a bearing calculate horizontal distance in the forest using pacing and chaining skills demonstrate open and closed traverses in the forest using compass and chaining skills calculate the diameter of trees using a diameter tape or other suitable equipment 	<p>Develop basic skills in measuring direction and distance in the forest.</p> <p>Invite resource persons from local government/industry to demonstrate:</p> <ul style="list-style-type: none"> compass and chain skills techniques in measuring the forest.
Compass and Measurement Skills (continued)	<ul style="list-style-type: none"> calculate the height of trees using a clinometre and measuring tape or other suitable equipment 	<p>Borrow necessary equipment from local government/industry organizations.</p>

MODULE FOR1060: MEASURING THE FOREST 1 (MEASUREMENT SKILLS) (continued)

Concept	Specific Learner Expectations	Notes
	<p><i>The student should:</i></p> <ul style="list-style-type: none"> demonstrate techniques used to determine the age of trees. 	Use short pieces of logs.
Sampling Technique	<ul style="list-style-type: none"> demonstrate compass and chaining skills to establish boundaries for a sample forest plot identify safety practices and policies relevant to gathering sample data in the forest describe data regarding one or more aspects of the fibre resource within the sample forest plot; e.g.: <ul style="list-style-type: none"> tree height/diameter number and distribution of species age of trees record sample data in appropriate tables and/or charts interpret sample data to make inferences regarding tree populations and fibre values in the forest region manipulate sample data as required to estimate fibre volumes. 	Contact local government/industry to obtain existing sample data.

MODULE FOR1090: FOREST ECOLOGY 1 (ECOSYSTEM DYNAMICS)

Level: Introductory

Content Focus: Management and Conservation

Prerequisite: None

Module Description: Students investigate forest ecosystems, and explain the structure and functioning of trees.

Module Parameters: Access to a science laboratory and/or forest environment.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none">describe interrelationships among elements in the forest ecosystem	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none">given access to information on forest ecology, completing a research project that examines:<ul style="list-style-type: none">interrelationships among at least three living and three nonliving elementspredator–prey–decomposer relationshipsdistribution of species on the basis of habitat requirements. <p><i>Assessment Tool</i> <i>Research Process: Forest Ecosystems, FOR1090–1</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 1 on the rating scale</i></p>	50
<ul style="list-style-type: none">describe structural units of the tree and their function in performing life processes	<ul style="list-style-type: none">identifying and describing major tree parts (including roots, trunk, branches, leaves, flowers), their function and relationship to one another. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Structural Units of the Tree, FOR1090–2</i> <i>Assessment Criteria: Diagrams and Technical Drawings, FORDRA</i></p> <p><i>Standard</i> <i>Respond to a standard of 1 on the rating scale</i></p>	50

MODULE FOR1090: FOREST ECOLOGY 1 (ECOSYSTEM DYNAMICS)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> conducting directed laboratory and/or field investigations that demonstrate three or more vital life processes performed by trees (e.g., nutrient uptake, photosynthesis, respiration, transpiration, reproduction). <p><i>Assessment Tool</i> <i>Lab Investigations: Tree Biology, FOR1090–3</i></p> <p><i>Standard</i> <i>Complete lab and/or field investigations to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
Forest Ecosystems	<p><i>The student should:</i></p> <ul style="list-style-type: none"> define and provide examples of: <ul style="list-style-type: none"> ecology/ecosystems abiotic/biotic factors abiotic/biotic interactions populations communities succession identify living and nonliving elements within a local forest ecosystem; e.g.: <ul style="list-style-type: none"> soil characteristics land form climate flora and fauna soil organisms 	<p>This module involves the application of ecosystem concepts within a forest environment.</p> <p>Use field trips to provide opportunities for the first-hand observation of components of a forest ecosystem.</p> <p>Observe forest layers (e.g., canopy, understory).</p> <p>Observe succession at the edge of clearings and fields, spruce under a pine forest, erosion along a river bank, old burn, etc.</p>

MODULE FOR1090: FOREST ECOLOGY 1 (ECOSYSTEM DYNAMICS)

Concept	Specific Learner Expectations	Notes
Forest Ecosystems (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe the interrelatedness of elements within a local forest environment; e.g.: <ul style="list-style-type: none"> relationship of soil, air and water characteristics to plant growth interactions and dependencies among living organisms explain the role of trees within a local forest ecosystem; e.g.: <ul style="list-style-type: none"> exchange of gases water cycle nutrient cycling wildlife habitat soil conservation describe food relationships among living organisms within a local forest environment; e.g.: <ul style="list-style-type: none"> role of producers, consumers and decomposers food chains and webs compare the ecological niches of selected plant and animal species native to Alberta. 	<p>Conduct experiments to demonstrate the interrelatedness of air, water, soil and plant growth.</p> <p>Observe evidence of plant growth being affected by particular environmental conditions (e.g., light, soil, moisture, crowding).</p> <p>Draw food webs/energy chains based on observations; e.g.:</p> <ul style="list-style-type: none"> • fungal damage • insect damage • wildlife browsing. <p>Observe evidence of insect or other animal life living on a tree or shrub. Collect and observe samples of insects by placing a sheet of plastic under the plant and tapping branches with a stick.</p>
Tree Biology	<ul style="list-style-type: none"> explain the vital life processes performed by trees and other forest plants; e.g.: <ul style="list-style-type: none"> nutrient intake and transportation photosynthesis respiration and transpiration reproduction phenology (leaf flushings, leaf fall, flowering and cone production) 	<p>Conduct laboratory experiments and demonstrations to examine life functions.</p> <p>Draw and label a cross-section of a tree (top to bottom) that illustrates structural units and component parts.</p>

MODULE FOR1090: FOREST ECOLOGY 1 (ECOSYSTEM DYNAMICS)

Concept	Specific Learner Expectations	Notes
Tree Biology (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe structural units and component parts of the tree, and their function in performing vital life processes; e.g.: <ul style="list-style-type: none"> – root – trunk/stem – leaf – flower infer interrelationships among tree structures, their functions, and vital life processes that are performed show the approximate range of one or more tree species throughout North America. 	<p>Use a microscope to observe and draw stomata and cells.</p> <p>Prepare a model by using a small tree; label all parts of the tree.</p> <p>Make tree discs; identify cross-sectional parts (e.g., cambium, sapwood, heartwood).</p> <p>Consider relationships among root, trunk, branch, leaf and flower.</p> <p>Discuss information conveyed through annual tree rings; examine the grain in dimensional lumber.</p>

MODULE FOR1100: FORESTS FOREVER 1 (FOREST USE & PROTECTION)

Level: Introductory

Theme: Management and Conservation

Prerequisite: None

Module Description: Students describe past and present uses of Canada's forests, and explain how research and technology assist in forest management.

Module Parameters: Access to government and industry organizations responsible for the sustainable management of forests (e.g., Alberta Environmental Protection, Canadian Forestry Service).

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<i>The student will:</i> <ul style="list-style-type: none">describe past and present uses of forests in Alberta and Canada	<i>Assessment of student achievement should be based on:</i> <ul style="list-style-type: none">identifying and explaining:<ul style="list-style-type: none">past and present uses of forests in Alberta and Canadaways in which changes in forest use (and management) have affected the economy and the environment. <i>Assessment Tool</i> <i>Knowledge/Application Assessment: Forest Use, FOR1100-1</i> <i>Standard</i> <i>Respond to a standard of 1 on the rating scale</i>	20
<ul style="list-style-type: none">explain how the consumptive and nonconsumptive use of forests has created a need for conservation and sustainable management of forested regions	<ul style="list-style-type: none">definitions and examples of sustainable yield and sustainable development within the context of Alberta's forested regions. <i>Assessment Tool</i> <i>Knowledge/Application Assessment: Sustainability, FOR1100-2</i> <i>Standard</i> <i>Respond to a standard of 1 on the rating scale</i>	30

MODULE FOR1100: FORESTS FOREVER 1 (FOREST USE & PROTECTION) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> describe the role of research and technology in forest protection 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> given a current issue regarding the management of a forested region: <ul style="list-style-type: none"> negotiating and debating the issue while assuming the role of one or more stakeholder groups preparing and presenting a position paper that outlines a responsible course of action. <p><i>Assessment Tool</i> <i>Negotiation and Debate: Introductory Level, FORNEG-1</i> <i>Position Paper: Forest Management, FOR1100-3</i></p> <p><i>Standard</i> <i>Address criteria in negotiation/debate and the position paper to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> completing a research project on major components of forest protection. <p><i>Assessment Tool</i> <i>Research Process: Components of Forest Protection, FOR1100-4</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> given access to a forest environment, identifying instances of pest and/or fire damage. Identification will involve: <ul style="list-style-type: none"> collecting and/or photographing pest problems correctly identifying four or more forest pests recommending appropriate prevention/control strategies for each pest identified. <p><i>Assessment Tool</i> <i>Task Checklist: Identifying Forest Pests, FOR1100-5</i> <i>Identification Key for Forest Pests, FOR1100-6</i> <i>Lab Assessment: Outdoor Forest Experiences, FORLAB</i></p> <p><i>Standard</i> <i>Achieve a performance rating of 1 in task assessment <u>and</u> lab assessment</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>50</p> <p>Integrated throughout</p>

MODULE FOR1100: FORESTS FOREVER 1 (FOREST USE & PROTECTION) (continued)

Concept	Specific Learner Expectations	Notes
Forest History	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe changing patterns of forest use in Canada and Alberta from past to present describe the history of the management of forested lands in Canada and Alberta infer the impact of historical trends in forest use and ownership on people, the economy and the environment make predictions about the use of Canada's forest resources in the future. 	<p>Trace the development of Alberta's forest land acts, policies and agencies.</p> <p>Supplementary reference materials include:</p> <ul style="list-style-type: none"> <i>A Forest Journey – The Role of Wood in the Development of Civilization</i> (Harvard University Press) <i>Canadian Forestry – The View Beyond the Trees</i> (Macmillan of Canada).
Conservation and Management	<ul style="list-style-type: none"> compare different uses of forested regions in terms of their advantages and disadvantages; e.g.: <ul style="list-style-type: none"> – environmental – economic – social describe the roles of different interest groups in managing the forest resource; e.g.: <ul style="list-style-type: none"> – government – forest industry – general public – other stakeholder groups relate concepts of sustainable development and sustained yield to practical strategies for managing the forest resource; e.g.: <ul style="list-style-type: none"> – reforestation – stand improvement describe an issue regarding sustainable development and/or sustained yield; e.g.: <ul style="list-style-type: none"> – conduct research – develop a position – participate in debate explain demands that are placed on forested regions of Canada and Alberta; e.g.: <ul style="list-style-type: none"> – industry – recreation – wildlife – environment 	<p>Invite resource persons from relevant government agencies and local forest industry.</p> <p>Prepare a poster/ collage/display that depicts different aspects of forest use.</p> <p>Visit local forest sites.</p> <p>Develop strategies for debate and consensus building (e.g., selective versus clearcut logging practices).</p> <p>Invite resource people from the community to critique debates.</p>

MODULE FOR1100: FORESTS FOREVER 1 (FOREST USE & PROTECTION) (continued)

Concept	Specific Learner Expectations	Notes
Conservation and Management (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify a plan for the integrated use of a local forested area; e.g.: <ul style="list-style-type: none"> – conduct research – generate alternatives – agree to a workable solution. 	Examine existing management plans.
Forest Protection	<ul style="list-style-type: none"> • explain reasons for protecting the forest resource; e.g.: <ul style="list-style-type: none"> – material and non-material benefits – environmental impact • identify and describe major components of forest protection; e.g.: <ul style="list-style-type: none"> – forest fire management – soil conservation and land reclamation – pest and disease management • explain basic goals and techniques of forest fire management, soil conservation and land reclamation • identify and describe symptoms of common forest pests and diseases • compare different methods of pest and disease control; e.g.: <ul style="list-style-type: none"> – biological methods – forest management – chemical methods. 	<p>Prepare a display of technologies used in forest protection.</p> <p>Invite a local forest ranger to explain components/ techniques of forest protection.</p> <p>Compare and contrast the consequences of forest fires and logging practices.</p> <p>Explain the fire triangle and methods used to control fire by removing one or more legs of the triangle.</p> <p>Visit a cutblock and examine for successful regeneration.</p> <p>Visit a plantation/tree nursery and examine seedlings.</p>

COURSE CURRICULUM AND ASSESSMENT STANDARDS:

SECTION E: INTERMEDIATE LEVEL

The following pages define the curriculum and assessment standards for the intermediate level of Forestry.

Intermediate level courses help students build on the competencies developed at the introductory level and focus on developing more complex competencies. They provide a broader perspective, helping students recognize the wide range of related career opportunities available within the strand.

Course FOR2010:	Making a Difference (Protection & Stewardship)	E.3
Course FOR2030:	Managing Alberta Forests	E.9
Course WLD2030:	Outdoor Experiences 2 (Wilderness Excursion)	E.15
Course FOR2060:	Measuring the Forest 2 (Sampling Techniques)	E.21
Course FOR2070:	Harvest Practices (Fibre Harvest & Processing)	E.25
Course FOR2100:	Forests Forever 2 (Management Practices)	E.31
Course FOR2120:	Users in the Forest	E.35

MODULE FOR2010: MAKING A DIFFERENCE (PROTECTION & STEWARDSHIP)

Level: Intermediate

Theme: Social and Cultural Perspectives

Prerequisite: None

Module Description: Students analyze the impact of attitudes, actions and lifestyles on forests, and propose individual and shared actions that foster environmental stewardship.

Module Parameters: Access to government and industry organizations responsible for sustainable forest development and environmental stewardship.

Note: Although this module involves analyzing the impact of lifestyle on forests, the major emphasis is on “doing” (i.e., commitment/empowerment through personal and shared actions).

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<i>The student will:</i> <ul style="list-style-type: none">describe the impact of personal attitudes, actions and lifestyle on the forest resource	<i>Assessment of student achievement should be based on:</i> <ul style="list-style-type: none">maintaining a log/journal of reflections and inferences regarding the impact of daily living activities on the forest environment. <i>Assessment Tool</i> <i>Reflection Guide for Environmental Responsibility/Citizenship, FORREF-ENV</i> <i>Guide to Inferences: Personal Impact on Forests, FOR2010-1</i> <i>Standard</i> <i>Complete five log/journal entries; address criteria for reflection and inferences to a standard of 2 on the rating scale</i>	10
<ul style="list-style-type: none">explain strategies for reducing, reusing and recycling	<ul style="list-style-type: none">completing all components of a research project on four or more products recently developed through recycling techniques. <i>Assessment Tool</i> <i>Research Process: Recycling Techniques, FOR2010-2</i> <i>Standard</i> <i>Complete research to a standard of 2 on the rating scale</i>	30

MODULE FOR2010: MAKING A DIFFERENCE (PROTECTION & STEWARDSHIP)
(continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate, through personal and shared actions, commitment to environmental responsibility/citizenship 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> identifying economic and environmental trade-offs that occur through reducing, reusing and recycling. <i>Assessment Tool</i> <i>Issue Analysis: Reducing, Reusing and Recycling, FOR2010–3</i> <i>Standard</i> <i>Address criteria in issue analysis to a standard of 2 on the rating scale</i> negotiating and debating an issue regarding the impact of lifestyle on forest environments. <i>Assessment Tool</i> <i>Negotiation and Debate: Intermediate Level, FORNEG–2</i> <i>Standard</i> <i>Address criteria in negotiation/debate to a standard of 2 on the rating scale</i> a proposal and rationale (oral, written or visual) for: <ul style="list-style-type: none"> one personal action that will affect forest ecosystems in positive ways one leadership role/community program in support of environmental stewardship. <i>Assessment Tool</i> <i>Assessment Criteria: Proposal for Environmental Action, FORPRO</i> <i>Standard</i> <i>Complete each proposal to a standard of 2 on the rating scale</i> volunteering five hours of time working with an environmental, forest industry or professional organization whose major goal is sustainable forest development. <i>Assessment Tool</i> <i>Log/Verification of Volunteer Work, FORLOG-VOL(a) or FORLOG-VOL(b)</i> <i>Standard</i> <i>Complete all sections of the log/verification for 5 hours of volunteer work</i> 	60

MODULE FOR 2010: MAKING A DIFFERENCE (PROTECTION & STEWARDSHIP)
(continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> a letter written to a government official, industry representative or environmental organization expressing support or concern regarding action taken on a forestry issue, and a critique of the response received. <p><i>Assessment Tool</i> <i>Assessment Criteria: Letters of Support or Concern, FORLET</i></p> <p><i>Standard</i> <i>Complete the letter and critique to a standard of 2 on the rating scale</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
Attitudes, Actions and Lifestyle	<p><i>The student should:</i></p> <ul style="list-style-type: none"> explain how societal attitudes, actions and lifestyle may affect the forest resource; e.g.: <ul style="list-style-type: none"> conservation ethic consumer practices recreational patterns describe factors that influence consumer and marketing trends, and how these trends may affect the forest resources; e.g.: <ul style="list-style-type: none"> social economic environmental create a personal inventory of possessions and material purchases made over the last year distinguish among personal needs and wants, as reflected through personal inventory evaluate the impacts of personal actions and lifestyle on the forest resource. 	<p>Plan for student-directed projects. Encourage students to express personal views and values.</p> <p>Consider 10 personal actions and their consequences on the forest.</p> <p>See <i>Alberta's Focus on Forests</i> (Activity 5.6–What's in the Waste-basket–Reassessing Our Needs).</p> <p>Facilitate student debates.</p>

MODULE FOR 2010: MAKING A DIFFERENCE (PROTECTION & STEWARDSHIP)
(continued)

Concept	Specific Learner Expectations	Notes
Reduce, Reuse and Recycle	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe and assess societal trends in the consumption of material goods identify common refuse that can be reused in practical and economical ways describe materials that are being recycled and the products that are produced describe trade-offs that occur through reducing, reusing and recycling; e.g.: <ul style="list-style-type: none"> economic environmental. 	<p>Consider linkages with Energy and Mines (ENM1090: Fundamentals of Recycling).</p> <p>Examples:</p> <ul style="list-style-type: none"> fence posts jewelry paper synthetic fibres. <p>Consider the advantages and disadvantages of</p> <ul style="list-style-type: none"> disposable cups versus reusable cups disposable diapers versus cloth diapers.
Environmental Responsibility/ Citizenship	<ul style="list-style-type: none"> identify personal strategies for using the forest resource that foster the attainment of social, cultural, economic and environmental goals; e.g.: <ul style="list-style-type: none"> personal actions leadership roles plan, conduct and assess a school-wide campaign to increase awareness of lifestyle, conservation and the environment; e.g.: <ul style="list-style-type: none"> establish goals plan and conduct assess results explain an issue regarding the impacts of lifestyle on the forest resource; e.g.: <ul style="list-style-type: none"> conduct research develop a position participate in debate 	<p>Develop consensus on a relevant issue.</p> <p>Ask students to prepare a contract expressing personal commitment to environmental stewardship. Review the contract after a period of time to ascertain if contract obligations are being met.</p> <p>Consider using case studies and simulations provided in <i>A Forest For All</i>, a multimedia kit developed by the Canadian Forest Products Association and distributed by Marwil Communications.</p>

MODULE FOR 2010: MAKING A DIFFERENCE (PROTECTION & STEWARDSHIP)
(continued)

Concept	Specific Learner Expectations	Notes
Environmental Responsibility/ Citizenship (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify constructive ways in which individuals can influence public decisions that affect the forest and all its resources; e.g.: <ul style="list-style-type: none"> – voting – lobbying – seeking office – supporting compatible interest groups • describe the goals and objectives of one or more conservation groups. 	Write letters of support and/or concern to government agencies, industry and/or environmental groups. Critique the responses that are received.

MODULE FOR2030: MANAGING ALBERTA FORESTS

Level: Intermediate

Theme: Social and Cultural Perspectives

Prerequisite: None

Module Description: Students research agencies and structures used to manage forested lands in Alberta.

Module Parameters: Access to government agencies responsible for forest management (e.g., Alberta Environmental Protection, Parks Canada).

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none">explain how Alberta's forested lands are managed	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none">preparing and presenting a report (written, oral or multimedia) that explains how Alberta's forested lands are administered. Report to include:<ul style="list-style-type: none">a timeline of changes that have occurred in the ownership and administration of forested landsa map and explanation of different land tenures (public and private)a list of five or more agencies responsible for managing forested lands within Alberta's boundaries, and the mandates of each agency. <p><i>Assessment Tool</i> <i>Presentations/Reports: Managing Alberta's Forested Lands, FOR2030-1</i> <i>Sample Timeline: Management History of Alberta's Forested Lands, FOR2030-2</i> <i>Task Checklist for Mapping, FORMAP</i></p> <p><i>Standard</i> <i>Complete all components of the report to a standard of 2 on the rating scale</i></p>	20

MODULE FOR2030: MANAGING ALBERTA FORESTS (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> describe government legislation and policies that influence the use of Alberta's forest resource 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> summarizing the general intent and major roles of: <ul style="list-style-type: none"> important government legislation in managing the forest regulations and/or guidelines established in association with government legislation for managing the forest. <p><i>Assessment Tool</i> <i>Sample Acts and Regulations for Managing Alberta's Forests, FOR2030-3</i></p> <p><i>Standard</i> <i>Summarize four important government legislation and four regulations and/or guidelines</i></p>	40
<ul style="list-style-type: none"> explain methods of allocating land and timber in forest management 	<ul style="list-style-type: none"> given access to current resources on forest management in Alberta, completing a research project that examines the intent of five or more: <ul style="list-style-type: none"> timber dispositions issued by Alberta Land and Forest Services other types of dispositions used to manage nonfibre aspects of forest use. <p><i>Assessment Tool</i> <i>Research Process: Allocation Procedures for Land and Timber, FOR2030-4</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 2 on the rating scale</i></p>	40
<ul style="list-style-type: none"> demonstrate basic competencies. 	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

MODULE FOR2030: MANAGING ALBERTA FORESTS (continued)

Concept	Specific Learner Expectations	Notes
Administration of Forested Lands	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe major changes that have occurred from past to present in the ownership and administration of forested lands in Alberta: <ul style="list-style-type: none"> federal jurisdiction provincial status <i>Natural Resources Transfer Act</i> describe different land tenures in Alberta today: <ul style="list-style-type: none"> public (provincial and federal crown lands) private identify, locate and compare different land management areas in Alberta: <ul style="list-style-type: none"> white area green area describe the mandates of agencies or groups responsible for managing forested lands within Alberta's boundaries, and the proportion of land under their jurisdiction. 	<p>Use archives, films and library resources to research the history of forestry in Alberta.</p> <p>Explain how the management of Alberta's forested lands became a responsibility of the provincial government.</p> <p>Contact Alberta Environmental Protection to obtain maps of land management areas in Alberta.</p> <p>Construct a circle graph depicting the distribution of land ownership in Alberta (e.g., provincial public, provincial private, federal public, aboriginal lands).</p> <p>For example,</p> <ul style="list-style-type: none"> Alberta Environmental Protection (Land and Forest Services, Parks Services, Fish and Wildlife Services) Parks Canada private ownership Metis or Native Indian Forestry Canada.

MODULE FOR2030: MANAGING ALBERTA FORESTS (continued)

Concept	Specific Learner Expectations	Notes
Government Legislation and Policies	<p><i>The student should:</i></p> <ul style="list-style-type: none"> explain how activities in Alberta's forests are subject to a variety of government legislation and regulations research the role of important government legislation in managing the forest research the role of regulations and guidelines established in association with government legislation in further managing the forest assess the short- and long-term effects of selected government legislation and regulations on forested land. 	<p>Contact Alberta Environmental Protection (or Queen's Printer, Province of Alberta) to request various legislation, regulations and guidelines used in managing forested lands.</p> <p>For example,</p> <ul style="list-style-type: none"> • <i>Forest Act</i> • <i>Forest Reserves Act</i> • <i>Forest and Prairie Protection Act</i> • <i>Provincial Parks Act</i> • <i>Wilderness Areas, Ecological Reserves and Natural Areas Act.</i> <p>For example,</p> <ul style="list-style-type: none"> • Timber Management Regulation • Timber Operating Groundrules • Reforestation Standards • Forest and Prairie Protection Regulation (Part I and II) • Forest Land Use Regulation (Recreation, Mineral, Pipeline, Grazing). <p>Avoid detailed analysis of acts and regulations; focus on an <u>OVERVIEW ONLY</u>.</p>
Allocation Procedures	<ul style="list-style-type: none"> explain the use of dispositions in managing commercial activities on forested lands identify criteria used to establish forest land and timber dispositions 	<p>For example, authorizations in the form of permits, licences or other legal agreements.</p> <p>Consider different public land users/uses. For example,</p> <ul style="list-style-type: none"> • fibre production • recreation • agriculture • wildlife habitat • integrated use.

MODULE FOR2030: MANAGING ALBERTA FORESTS (continued)

Concept	Specific Learner Expectations	Notes
Allocation Procedures (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • explain the intent of different timber dispositions issued by the Alberta Forest Service, and the responsibilities of holders of these dispositions • describe other types of dispositions that are used to manage nonfibre aspects of forest use • research the role of consultation (with other resource users) and public involvement in establishing land and timber dispositions. 	<p>For example,</p> <ul style="list-style-type: none"> • Forest Management Agreements (FMAs) • Quota Certificates • Timber Licences • Commercial Timber Permits • Local Timber Permits. <p>For example,</p> <ul style="list-style-type: none"> • grazing • hunting, fishing and trapping • energy and mineral development • commercial trail riding. <p>Involve students in role-playing activities.</p>

COURSE WLD2030: OUTDOOR EXPERIENCES 2 (WILDERNESS EXCURSION)

Level: Intermediate

Theme: Social and Cultural Perspectives

Prerequisites: WLD1030 Outdoor Experiences 1 (Survival Skills)
Emergency First Aid (current certification)

Description: Students plan, prepare for and conduct an extended outdoor wilderness trip.

Parameters: Access to an outdoor wilderness environment and gear for outdoor expeditions. Instructor training (current certification) in Standard Level First Aid is required; instructor training in First Aid in the Wilderness is recommended.

Teachers may find it desirable to access the services of a qualified Outdoor Guide in delivering components of this course.

Off-campus learning activities must be commensurate with previous levels of wilderness training and experience; day trips should precede extended overnight trips; experience in hardcover camping should precede potential softcover camping and/or emergency shelter camping opportunities.

Note: Specific outcomes in Outdoor Experiences 1 and 2 link with the *National Occupational Standards for Outdoor Guide* (Alberta Tourism Education Council), and address core skills in Environmental Awareness, Camp and/or Trip Operation, Safety and Survival.

See Section C (Planning for Instruction) and Section H (Linkages/Transitions) of this Guide for further information on instructor training/certification and linkages.

Supporting Course: CTR1210 Personal Safety (Management) [Career Transitions Strand]

Because of the practical nature of this course, students must have a general knowledge of basic first-aid and survival techniques relevant to wilderness environments. See Planning for Instruction in Section C for further information on student safety.

Note: WLD1030 and WLD2030 (Outdoor Experiences 1 and 2) provide opportunities for wilderness interaction at a personal level. This course sequence should place emphasis on developing skills that will enable students to safely observe and appreciate wildlife and habitat within one or more of Alberta's six natural regions.

COURSE WLD2030: OUTDOOR EXPERIENCES 2 (WILDERNESS EXCURSION) (continued)

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> present a plan for an extended outdoor wilderness trip 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> developing and presenting collaborative group plans for an extended outdoor wilderness trip as outlined in the <i>National Occupational Standards for Outdoor Guide</i> (see <u>Camp and/or Trip Operation</u>: Prepare for Trips). Group plans to address: <ul style="list-style-type: none"> pre-trip planning and logistics equipment and supply requirements organization of personal gear. <p><i>Assessment Tools</i> National Occupational Standards for Outdoor Guide <i>Task Checklist: Outdoor Experiences 2, WLD2030-1</i></p> <p><i>Standard</i> <i>Complete each component of trip planning to a standard of 2 on the rating scale</i></p>	20
<ul style="list-style-type: none"> conduct and conclude, safely, an extended outdoor wilderness trip with minimal environmental impact 	<ul style="list-style-type: none"> within a continuous timeframe of at least 72 hours, and through access to an outdoor environment, conduct and conclude the trip as outlined in the <i>National Occupational Standards for Outdoor Guide</i> (see <u>Camp and/or Trip Operation</u>: Conduct Trips, <u>Legal Issues</u>: Comply With Legislation and <u>Environmental Awareness</u>: Minimize Impact). The student will demonstrate procedures for: <ul style="list-style-type: none"> setting up camp preparing meals ensuring safety and survival of self and others complying with pertinent legislation breaking camp ensuring least possible environmental impact. <p><i>Assessment Tools</i> National Occupational Standards for Outdoor Guide <i>Task Checklist: Outdoor Experiences 2, WLD2030-1</i></p> <p><i>Standard</i> <i>Conduct and conclude the trip to a standard of 2 on the rating scale</i></p>	80

COURSE WLD2030: OUTDOOR EXPERIENCES 2 (WILDERNESS EXCURSION) (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> successfully participating in activities while en route that involve personal interaction with the wilderness environment. <p><i>Assessment Tool</i> <i>Task Checklist: Outdoor Experiences 2, WLD2030-1</i></p> <p><i>Standard</i> <i>Complete four of the activities (as outlined in the task checklist) that involve personal interaction with the wilderness environment to a standard of 2 on the rating scale</i></p> <ul style="list-style-type: none"> a post-trip assessment that provides observations and personal impressions, and summarizes: <ul style="list-style-type: none"> activities well done problems encountered and suggested solutions recommendations regarding future trips. <p><i>Assessment Tool</i> <i>Post-Trip Assessment for Outdoor Experiences 2, WLD2030-2</i></p> <p><i>Standard</i> <i>Achieve a performance rating of 2 in applicable areas of post-trip assessment</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction throughout the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

COURSE WLD2030: OUTDOOR EXPERIENCES 2 (WILDERNESS EXCURSION) (continued)

Concept	Specific Outcomes	Notes
Trip Planning and Preparation	<p><i>The student should:</i></p> <ul style="list-style-type: none"> establish specific objectives for an outdoor wilderness trip; e.g.: <ul style="list-style-type: none"> goals and expectations length of trip destination general schedule and agenda incorporate guidelines for environmental awareness into trip planning and preparation; e.g.: <ul style="list-style-type: none"> principles of ecotourism consideration for carrying capacity of the area strategies for minimum impact land use identify and obtain appropriate supplies, equipment and personal gear for the trip; e.g.: <ul style="list-style-type: none"> water and food tents, stoves, axe first-aid and survival kits clothing and foot wear toiletries devise plan for weather and seasonal conditions; e.g.: <ul style="list-style-type: none"> identify hazards particular to the area listen to weather and news reports and forecasts conduct a pre-trip assessment of supplies, equipment and personal gear; e.g.: <ul style="list-style-type: none"> compare to trip checklist assess quality, quantity and condition assess relative to weather and seasonal conditions obtain missing and/or specialty items 	<p>Hold a pre-trip meeting with students and their parents/guardians prior to the excursion to confirm trip details. Obtain information regarding special needs (e.g., physical limitations, special dietary requirements). Discuss trip expectations.</p> <p>Obtain <i>Travel Alberta's Adventure Guide</i> (published annually) for a list of outfitters/guides available throughout the province.</p> <p>List potential environmental impacts that may result from the trip. Write before and after journal entries to document impact of a campsite.</p> <p>List all supplies and equipment to be taken on the trip. Identify items that may have significant environmental impact—note considerations for use or alternatives that would lessen impact.</p> <p>Establish methods of regular and emergency communication, and a contingency plan to be used if regular communication is interrupted.</p> <p>Compare supplies to checklist. Ensure all equipment is in satisfactory working condition. Pack supplies/equipment in waterproof containers.</p>

COURSE WLD2030: OUTDOOR EXPERIENCES 2 (WILDERNESS EXCURSION) (continued)

Concept	Specific Outcomes	Notes
Trip Planning and Preparation (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • prepare supplies, equipment and personal gear for transportation • devise plan for courses of action to cope with potential emergency situations in the wilderness; e.g.: <ul style="list-style-type: none"> – extreme weather conditions – fire or flood – injury and illness. 	<p>Potential linkages exist with the “First Aid in the Wilderness” certificate course (see Section H: Transitions/Linkages).</p> <p>Outline requirements for survival and first-aid kits.</p>
Conducting and Concluding the Trip	<ul style="list-style-type: none"> • follow guidelines for safe outdoor travel; e.g.: <ul style="list-style-type: none"> – inform responsible person of travel plans – follow travel schedule as planned – use orientation and navigational skills – identify potential hazards and take necessary precautions – dress according to mode of travel, weather and season – watch for changes in weather conditions • set up a wilderness camp site, following guidelines for comfort, safety and least possible environmental impact; e.g.: <ul style="list-style-type: none"> – select camp site considering: <ul style="list-style-type: none"> • site exposure and drainage • access to water and firewood • impact on flora and fauna • proximity to potential dangers – erect tent or lean-to – assemble other amenities – protect food from wildlife and spoilage – protect equipment from the elements • follow minimal impact guidelines in establishing: <ul style="list-style-type: none"> – latrine location and toilet procedures – wash area and procedures – fire site and use – methods of garbage and waste water disposal • comply with local, provincial and federal legislation relevant to activities that are undertaken 	<p>Be aware of hazards particular to the area. Listen to weather and news reports. Carry survival equipment.</p> <p>Reroute, postpone or cancel trip if conditions threaten safety.</p> <p>Select dry, level ground. Consider potential hazards, including fire, rock slides, avalanches, dead materials close to shelter.</p> <p>Dig deep hole for toilet pit. Provide soil and environmentally friendly substance to decrease odour and speed decomposition. Use biodegradable soap.</p> <p>Consider land use, permits, seasonal restrictions, quotas, etc. Seek clarification if necessary. Report violations.</p>

COURSE WLD2030: OUTDOOR EXPERIENCES 2 (WILDERNESS EXCURSION) (continued)

Concept	Specific Outcomes	Notes
Conducting and Concluding the Trip (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> assume outdoor camp duties on a rotational basis; e.g.: <ul style="list-style-type: none"> meal preparation camp maintenance and hygiene demonstrate practical knowledge and skills in at least three areas relevant to wilderness interaction; e.g.: <ul style="list-style-type: none"> plant or animal identification animal track and scat identification use of equipment survival skills monitor the activities of wildlife in the area and take precautions to avoid dangerous situations; e.g.: <ul style="list-style-type: none"> observe animal behaviours observe social patterns/relationships identify wildlife hazards describe evidence of human impact on flora, fauna and/or natural habitat follow appropriate procedures to break camp; e.g.: <ul style="list-style-type: none"> pack supplies, equipment and personal gear take down shelter clean site conclude the wilderness trip and conduct a post-trip assessment; e.g.: <ul style="list-style-type: none"> observations and personal impressions problems encountered recommendations regarding future trips. 	<p>Have students participate in all areas of preparation, operation and clean-up. Alternate chores during trip.</p> <p>Reference the activities and suggestions provided in <i>The Art of Seeing and Tracking</i>.</p> <p>Make plaster casts of animal tracks; examine fur, skulls, bones, nests, etc.</p> <p>Dispose of garbage properly. Store food safely. Maintain safe distance from wildlife.</p> <p>Do circle tour of camp—look for garbage and misplaced equipment.</p> <p>Develop a slide/tape presentation based on the outdoor trip.</p> <p>Consider:</p> <ul style="list-style-type: none"> satisfaction with equipment and supplies suitability of environment or route inconsistencies between trip and expectations.

COURSE FOR2060: MEASURING THE FOREST 2 (SAMPLING TECHNIQUES)

Level: Intermediate

Theme: Technology and Applications

Prerequisite: FOR1060 Measuring the Forest 1 (Measurement Skills)
Emergency First Aid (current certification)

Course Description: Students research current forest inventory practices, and demonstrate appropriate strategies for sampling the fibre and nonfibre values of forests.

Course Parameters: Access to a demonstration forest and forest measurement tools.

Instructor training (current certification) in Standard Level First Aid is required.

See Section C (Planning for Instruction) and Section H (Linkages/Transitions) for further information on instructor training and certification.

Support Course: CTR1210 Personal Safety (Management) [Career Transitions Strand]

Because of the practical nature of this course, students must have a general knowledge of basic first-aid and survival techniques relevant to forest environments. See Planning for Instruction in Section C for further information on student safety.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<i>The student will:</i> <ul style="list-style-type: none">describe random and systematic sampling techniques for gathering information about the forest resource	<i>Assessment of student achievement should be based on:</i> <ul style="list-style-type: none">completing a research project on random and systematic sampling techniques and their application in gathering data about fibre and nonfibre forest values. Research to address problems related to bias, error, and the use of sample data in estimating forest populations. <i>Assessment Tool</i> <i>Research Process: Random and Systematic Sampling Techniques, FOR2060-1</i> <i>Standard</i> <i>Complete all components of research to a standard of 2 on the rating scale</i>	20

COURSE FOR2060: MEASURING THE FOREST 2 (SAMPLING TECHNIQUE) (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> gather sample data regarding fibre and nonfibre values in a forested region 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> designing a sampling technique (transect and plot) for gathering information about a specific fibre <u>and</u> nonfibre resource (e.g., trees, rabbits, soil, grass, insects). Design to address: <ul style="list-style-type: none"> goals/outcomes for the forest survey type and amount of data to be collected suitable sampling techniques boundary for sample area a data collection sheet. <p><i>Assessment Tool</i> <i>Task Checklist: Sampling Fibre and Nonfibre Forest Values, FOR2060–2</i></p> <p><i>Standard</i> <i>Design the sampling technique(as outlined in the task checklist) to a standard of 2 on the rating scale</i></p>	30
	<ul style="list-style-type: none"> collecting and recording sample data on a representative forested area, and compiling sample data in order to estimate the fibre <u>and</u> nonfibre resource within the forested area. Fibre data sampling to involve transects and plots, and to be accurate within 10%. <p><i>Assessment Tool</i> <i>Task Checklist: Sampling Fibre and Nonfibre Forest Values, FOR2060–2</i> <i>Sample Data Sheet: Fibre and Nonfibre Forest Values, FOR2060–3</i> <i>Lab Assessment: Outdoor Forest Experiences, FORLAB</i></p> <p><i>Standard</i> <i>Collect, record and compile sample data (as outlined in the task checklist <u>and</u> lab assessment) to a standard of 2 on the rating scale</i></p>	40

MODULE FOR2060: MEASURING THE FOREST 2 (SAMPLING TECHNIQUE) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> summarizing and assessing the strengths and weaknesses of the sample data and statements made about the forest resource. <p><i>Assessment Tool</i> <i>Task Checklist: Sampling Fibre and Nonfibre Forest Values, FOR2060-2</i></p> <p><i>Standard</i> <i>Summarize and assess survey results (as outlined in the task checklist) to a standard of 2 on the rating scale</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>10</p> <p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
Sample Designs	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe different sampling designs and techniques: <ul style="list-style-type: none"> random systematic describe sample designs and techniques most suited to gathering data about specific forest components identify bias and error in sampling design, and problems related to the use of sample data in estimating forest populations. 	<p>Investigate applications of</p> <ul style="list-style-type: none"> transects plots/nested plots surveys and questionnaires. <p>For example:</p> <ul style="list-style-type: none"> distribution of tree species growth, age and/or volume of trees soil, water and/or wildlife characteristics potential for recreation and/or agriculture.

MODULE FOR2060: MEASURING THE FOREST 2 (SAMPLING TECHNIQUE) (continued)

Concept	Specific Learner Expectations	Notes
Fibre and Nonfibre Values	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify goals/outcomes for a forest survey • identify the type and amount of information regarding the forest resource that is required • design techniques for sampling the forest region that are most suited to gathering the type of information required • calculate and locate the boundary of the sample area within the forest region • identify safety practices and policies relevant to gathering sample data in the forest • gather data regarding the volume and/or condition of timber resources within the sample plots • gather data regarding the nature of other nonfibre resources present within the sample plots • record sample data regarding fibre and nonfibre resources in appropriate tables and charts • compile sample data as required to estimate fibre volumes and other nonfibre values within the forest region • assess the strengths and weaknesses of the sample data and statements made about the forest resource. 	<p>PLAN AND SHARE - LEARN FROM OTHERS.</p> <p>Develop, as a class project, a sampling design appropriate to surveying a specific forest resource. Use the sampling design to collect data.</p> <p>For example,</p> <ul style="list-style-type: none"> • tree height/diameter • age of trees • number and distribution of species. <p>For example,</p> <ul style="list-style-type: none"> • soil and water quality • distribution of wildlife • potential for recreation/agriculture. <p>Make estimates regarding the forest population based on data collected.</p> <p>Discuss the validity/reliability of results.</p>

MODULE FOR2070: HARVEST PRACTICES (FIBRE HARVEST & PROCESSING)

Level: Intermediate

Theme: Technology and Applications

Prerequisite: None

Module Description: Students research the steps involved in harvesting and processing the forest fibre resource.

Module Parameters: Access to forest harvest areas and forest products industries.

Off-campus learning may support components of research related to forest harvest and fibre utilization; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education, 1997) for further information regarding off-campus learning.

Supporting Module: CTR2210 Workplace Safety Practices [Career Transitions Strand]

Students must have a general knowledge of potential hazards and accepted safety practices relevant to forest harvest sites prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C for further information regarding student safety.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none">identify major components of a plan for a forest harvest	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none">identifying major components of a plan for forest harvest, including:<ul style="list-style-type: none">when and how much to cutmethods of harvest (e.g., clearcutting, shelter wood method) and logging (e.g., hand, mechanical)regeneration and environmental protection. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Forest Harvest, FOR2070-1</i> <i>Sample Checklist: Forest Harvest Plans, FOR2070-2</i></p> <p><i>Standard</i> <i>Respond to a standard of 2 on the rating scale</i></p>	15

MODULE FOR2070: HARVEST PRACTICES (FIBRE HARVEST & PROCESSING)
(continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> describe the mechanics of harvesting trees 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> a teacher-prepared assessment in which the student demonstrates knowledge of major components and considerations relevant to harvest planning. <p><i>Assessment Tool</i> <i>Sample Assessment Items: Forest Harvest, FOR2070-3</i></p> <p><i>Standard</i> <i>Response indicating 65% mastery</i></p> <ul style="list-style-type: none"> a presentation or report that describes major stages in the harvesting procedure from stump to mill. Presentation/report to address: <ul style="list-style-type: none"> methods of falling, bucking, delimbing, skidding, loading, hauling, slash disposal and site rehabilitation technologies (e.g., machines, processes) used in the harvesting procedure safety considerations (e.g., legislation, equipment, procedures) relevant to the harvesting operation. <p><i>Assessment Tool</i> <i>Presentations/Reports: Intermediate Level, FORPRE-2</i></p> <p><i>Standard</i> <i>Achieve a minimum rating of 2 on the rating scale for Presentations/Reports</i></p>	50
<ul style="list-style-type: none"> explain techniques used in fibre utilization and product formation 	<ul style="list-style-type: none"> completing a research project on fibre utilization and product formation. Research to address: <ul style="list-style-type: none"> major categories/types of forest products steps involved in converting a log into lumber, pulp and one other forest product new developments in milling and pulping technology. <p><i>Assessment Tool</i> <i>Research Process: Fibre Utilization and Product Formation, FOR2070-4</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 2 on the rating scale</i></p>	25

MODULE FOR2070: HARVEST PRACTICES (FIBRE HARVEST & PROCESSING)

(continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> describe career opportunities relevant to forest harvesting and fibre use demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> given current information on career opportunities in forest harvest and fibre utilization, completing a research project on one or more occupations in related fields. <p><i>Assessment Tool</i> <i>Career Search: Intermediate Level, FORCAR-2</i></p> <p><i>Standard</i> <i>Conduct research to a standard of 2 on the rating scale</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>10</p> <p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
Harvest Plan	<p><i>The student should:</i></p> <ul style="list-style-type: none"> identify major components of a plan for harvesting the forest: <ul style="list-style-type: none"> when and how much to cut method of harvest (e.g., clearcutting, shelter wood method) and logging (e.g., hand, mechanical) regeneration and environmental protection relate the concepts of allowable cut, sustained yield and multiple use to forest harvest practices 	<p>This module develops appropriate background knowledge for FOR2120 (Users in the Forest) and FOR3120 (Integrated Resource Management).</p> <p>Discuss essential components of a forest harvest plan—DO NOT make a plan. Use resource persons from government and industry if possible.</p>

MODULE FOR2070: HARVEST PRACTICES (FIBRE HARVEST & PROCESSING)
(continued)

Concept	Specific Learner Expectations	Notes
Harvest Plan (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • explain applications of forest inventory information in establishing a plan for harvest: <ul style="list-style-type: none"> – identification of tree species – determining timber quality, volume and age – layout of cutting area and landing sites – planning for forest access • describe applications of different methods of forest harvest: <ul style="list-style-type: none"> – clearcutting – selective cutting – shelter wood cutting • describe applications of different methods of forest regeneration: <ul style="list-style-type: none"> – natural – artificial • identify environmental concerns to be addressed through harvest plans: <ul style="list-style-type: none"> – protection of sensitive areas – impact on downstream values – landslide and erosion hazards. 	<p>Videos relevant to harvest planning and available from Alberta Pacific Forest Industries (telephone: 1-800-661-5210) include:</p> <ul style="list-style-type: none"> • <i>A Pledge to the Future: The Alberta Pacific Story</i> (23 minutes) • <i>With Eyes on Tomorrow</i> (38 minutes). <p>Identify considerations relevant to establishing the size and location of harvest tracts.</p> <p>Investigate road and landing requirements for a local harvest operation.</p> <p>Discuss the scheduling of equipment and completion dates for harvest operations.</p>
Harvest Techniques	<ul style="list-style-type: none"> • identify stages in the harvesting procedure from stump to mill: <ul style="list-style-type: none"> – falling, bucking and delimbing – skidding – loading and hauling • describe techniques and equipment used to fell, buck and delimb trees in a forest harvest operation • describe techniques and equipment used to transport logs from stump to landing site in a forest harvest operation • describe techniques and equipment used to transport logs from landing site to mill in a forest harvest operation 	<p>Plan for off-campus learning activities that will enable students to follow the tree from harvest to finished product.</p> <p>Ask students to describe the processes used in felling, bucking and delimbing a tree.</p> <p>For example,</p> <ul style="list-style-type: none"> • horses • mechanical skidders. <p>Contact local forest industry /forest industry suppliers for guest speakers and print material.</p>

MODULE FOR2070: HARVEST PRACTICES (FIBRE HARVEST & PROCESSING)
(continued)

Concept	Specific Learner Expectations	Notes
Harvest Techniques (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe techniques used in slash disposal and site rehabilitation following logging operations in a forest area identify safety legislation and requirements relevant to visiting a forest harvest site. 	<p>Arrange for students to work with a local landowner in reclaiming an eroded forest area.</p> <p>Identify safety precautions relevant to felling and transporting trees. Contact Occupational Health and Safety for:</p> <ul style="list-style-type: none"> <i>Logging Safety Manual</i> <i>Chain Saw Safety Manual</i> <i>Safety Log Transport Manual.</i>
Fibre Products	<ul style="list-style-type: none"> identify major categories of forest products and give examples of each: <ul style="list-style-type: none"> pulp and paper lumber veneer and plywood board products chemical and medicinal products describe the steps and processes involved in log utilization at a sawmill describe the steps and processes involved in fibre utilization at a pulp mill: <ul style="list-style-type: none"> mechanical chemical. 	<p>Visit a sawmill and pulp mill; prepare reports based on information gathered through visits.</p> <p>Make a list of the major tasks performed at a sawmill.</p> <p>Demonstrate and explain processes involved in producing a fibre product (e.g., paper).</p> <p>View <i>Weyerhaeuser - OSB Production</i>, a 30-minute video distributed by Ranson Productions, Edmonton (telephone: 403-437-3400).</p> <p>Identify safety regulations pertinent to sawmill and pulp mill operations.</p>

MODULE FOR2070: HARVEST PRACTICES (FIBRE HARVEST & PROCESSING)
(continued)

Concept	Specific Learner Expectations	Notes
Career Opportunities	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe potential careers in forest harvest and fibre utilization: <ul style="list-style-type: none"> professional technical labour-based describe employment statistics within one or more areas of specialization ; e.g.: <ul style="list-style-type: none"> types of careers number of workers employment trends infer career opportunities and trends from employment statistics infer impacts of technology development and the marketplace on employment opportunities predict possible forest harvest and/or fibre utilization industries in the future, and resulting career opportunities. 	<p>Interview people employed in forest harvest and fibre utilization industries. Identify general areas of industry specialization.</p> <p>Review National Occupational Profiles (NOC).</p> <p>Contact the "Career Hotline" (telephone 1-800-661-3753).</p> <p>Gather information from senior management people in the forest industry; also producers of value-added products.</p>

MODULE FOR2100: FORESTS FOREVER 2 (MANAGEMENT PRACTICES)

Level: Intermediate

Theme: Management and Conservation

Prerequisite: FOR1100 Forests Forever 1 (Forest Use & Protection)

Module Description: Students explain Alberta's forest management goals, and describe the current management practices used to address these goals.

Module Parameters: Access government and industry organizations responsible for the sustainable management of forests (e.g., Alberta Environmental Protection, Canadian Forestry Service).

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<i>The student will:</i> <ul style="list-style-type: none">explain the goals of Alberta forest management	<i>Assessment of student achievement should be based on:</i> <ul style="list-style-type: none">developing a rationale for forest management in Alberta that involves:<ul style="list-style-type: none">identifying economic, environmental and social needs addressed through forest managementdefinitions and examples of sustainable development, sustained yield and allowable cut. <i>Assessment Tool</i> <i>Knowledge/Application Assessment: Forest Management Goals, FOR2100-1</i> <i>Standard</i> <i>Respond to a standard of 2 on the rating scale</i>	30
<ul style="list-style-type: none">identify different types of forest use and the views and values of different users in the forest	<ul style="list-style-type: none">analyzing current issues related to different types of forest use. Analysis to include:<ul style="list-style-type: none">a list of current uses/values of Alberta's forestsa summary of the views of different forest stakeholder groupsan explanation of potential conflicts among stakeholder groupsstrategies for compromise and/or conflict resolution. <i>Assessment Tool</i> <i>Issue Analysis: Forest Use, FOR2100-2</i> <i>Standard</i> <i>Address criteria in issue analysis to a standard of 2 on the rating scale</i>	30

MODULE FOR2100: FORESTS FOREVER 2 (MANAGEMENT PRACTICES) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> describe sustainable management practices within the context of Alberta's forested lands 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> completing a research project on forest management practices in Alberta. Research to address: <ul style="list-style-type: none"> definitions and examples of conservation and preservation different philosophies regarding forest management and protection the mandates of agencies responsible for managing Alberta's forested lands the intent of different agreements, permits and/or licences that make Alberta's forests available for commercial or private use factors likely to influence future forest management in Alberta. <p><i>Assessment Tool</i> <i>Research Process: Forest Management Practices, FOR2100-3</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 2 on the rating scale</i></p>	40
<ul style="list-style-type: none"> demonstrate basic competencies. 	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

Concept	Specific Learner Expectations	Notes
Forest Management Goals	<p><i>The student should:</i></p> <ul style="list-style-type: none"> explain the goals of sustainable development within the context of Alberta's forests relate the concept of sustained yield to a system of harvesting and reforestation explain applications of "annual allowable cut" in forest management practices 	<p>Refer to <i>Our Growing Resource: Alberta's Forest Industry... Meeting Global Challenges</i> (available from the Alberta Forest Products Association).</p>

MODULE FOR2100: FORESTS FOREVER 2 (MANAGEMENT PRACTICES) (continued)

Concept	Specific Learner Expectations	Notes
Forest Management Goals (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> identify scientific, economic and social factors addressed through the management of forested lands in Alberta. 	<p>Possible factors to consider:</p> <ul style="list-style-type: none"> the silvics of trees growing in the area a cycle for utilization and replacement the goals of different stakeholder groups.
Forest Uses and Users	<ul style="list-style-type: none"> compare current uses and values of Alberta's forests: <ul style="list-style-type: none"> recreation and aesthetics wildlife habitat fibre production range lands coal and petroleum projects hunting and trapping water, air and soil quality ecosystem maintenance job creation describe the views of different forest stakeholder groups and potential conflicts that may arise: <ul style="list-style-type: none"> recreational environmental industrial explain the need for consultation with other resource users and public involvement in forest management. 	<p>See <i>Alberta's Focus on Forests</i> (Activity 4.3–Forest Perspectives; Activity 5.1–Forest Values).</p> <p>Supplementary sources of information include:</p> <ul style="list-style-type: none"> <i>A Forest Journey – The Role of Wood in the Development of Civilization</i> (Harvard University Press) <i>Canadian Forestry – The View Beyond the Trees</i> (Macmillan of Canada). <p>Encourage and facilitate activities that involve:</p> <ul style="list-style-type: none"> roleplaying discussion interviewing.
Forest Management Practices	<ul style="list-style-type: none"> identify components of conservation and utilization in current forest management practices describe the mandates of agencies responsible for managing Alberta's forested lands 	<p>Contact resource persons from relevant government and industry organizations.</p> <p>For example:</p> <ul style="list-style-type: none"> Alberta Forest Service Fish and Wildlife Public Lands Land Information Services.

MODULE FOR2100: FORESTS FOREVER 2 (MANAGEMENT PRACTICES) (continued)

Concept	Specific Learner Expectations	Notes
Forest Management Practices (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe current management practices that make Alberta's productive forests available to industry for commercial harvest: <ul style="list-style-type: none"> forest management agreements quota certificates commercial timber permits local timber permits predict factors likely to influence future forest management practices. 	<p>Plan for group research and presentations.</p> <p>Possible factors to consider include:</p> <ul style="list-style-type: none"> new knowledge and technology increased public participation in decision making population trends recreation and tourism natural resource extraction.

MODULE FOR2120: USERS IN THE FOREST

Level: Intermediate

Theme: Management and Conservation

Prerequisite: None

Module Description: Students identify different forest users, and explain the planning principles used to develop an integrated resource management plan.

Module Parameters: Access to forest management plans available from government and industry organizations (e.g., Alberta Environmental Protection, Alberta Forest Products Association).

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<i>The student will:</i> <ul style="list-style-type: none">identify different uses of the forest and the needs of each forest user	<i>Assessment of student achievement should be based on:</i> <ul style="list-style-type: none">identifying four or more major categories of forest use (e.g., industry, recreation, tourism, environmental) and examples of forest users within each category. <i>Assessment Tool</i> <i>Knowledge/Application Assessment: Users in the Forest, FOR2120-1</i>	10
<ul style="list-style-type: none">explain principles of multiple and integrated land use	<i>Standard</i> <i>Respond to a standard of 2 on the rating scale</i> <ul style="list-style-type: none">completing a research project on the principles of multiple and integrated land use. Research to address:<ul style="list-style-type: none">definitions and Alberta examples of multiple and integrated land usea comparison of multiple land use and integrated land use principles. <i>Assessment Tool</i> <i>Research Process: Multiple and Integrated Land Use, FOR2120-2</i> <i>Standard</i> <i>Complete all components of research to a standard of 2 on the rating scale</i>	30

MODULE FOR2120: USERS IN THE FOREST (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> describe a plan for integrated resource management 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> a flow chart that outlines basic components of integrated resource management. Flow chart to provide an overview of processes used to: <ul style="list-style-type: none"> establish planning teams determine management goals and objectives ensure public involvement in planning obtain approval for the management plan. <p><i>Assessment Tool</i> <i>Assessment Criteria: Flow Charts, FORFLO</i></p> <p><i>Standard</i> <i>Complete flow chart to a standard of 2 on the rating scale</i></p> <ul style="list-style-type: none"> negotiating and presenting a plan for the integrated use of a local forested area. Plan to address: <ul style="list-style-type: none"> the needs of at least four different users strategies for compromise among users. <p><i>Assessment Tools</i> <i>Alberta's Focus on Forests (Section 5.5: Integrated Resource Management</i> <i>Negotiation and Debate: Intermediate Level, FORNEG-2</i></p> <p><i>Standard</i> <i>Negotiate and present the plan to a standard of 2 on the rating scale</i></p>	60
<ul style="list-style-type: none"> demonstrate basic competencies. 	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

MODULE FOR2120: USERS IN THE FOREST (continued)

Concept	Specific Learner Expectations	Notes
Forest Uses	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify and describe four or more major types of forest uses; e.g.: <ul style="list-style-type: none"> – industrial – recreational – wildlife habitat – water, air and soil quality • describe specific uses and multiple demands placed upon forested land; e.g.: <ul style="list-style-type: none"> – wood fibre production – wildlife management – grazing and range management – watershed – oil, gas and mining – recreation – protected areas • explain why forests can and should serve many purposes • describe examples of a variety of uses of Alberta's forests; e.g.: <ul style="list-style-type: none"> – using different parts of the forest for different purposes – using the same area of the forest to obtain more than one benefit. 	<p>Introduce the module by reviewing the social, economic and environmental significance of forests.</p> <p>Plan for collaborative group projects and activities.</p>
Multiple and Integrated Land Use	<ul style="list-style-type: none"> • demonstrate how integrated land use involves using a common area of forested land for two or more purposes; e.g.: <ul style="list-style-type: none"> – wood fibre – range – wildlife – recreation – mining • describe examples of the integrated use of local forested lands • compare principles of integrated land use with principles of multiple use management • explain the goals of Integrated Resource Planning (IRP) in establishing policy and guidelines for managing forested land. 	<p>Contact a Land Use Officer (Land and Forest Services, Alberta Environmental Protection) for research materials.</p> <p>Support learning through the development of role-playing activities.</p>

MODULE FOR2120: USERS IN THE FOREST (continued)

Concept	Specific Learner Expectations	Notes
Integrated Resource Management	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify and describe the basic components of Integrated Resource Planning (IRP); e.g.: <ul style="list-style-type: none"> – establishing a planning team – setting goals and objectives – soliciting public involvement – obtaining approval for the plan • prepare a flow chart that outlines relationships among the components of Integrated Resource Planning (IRP) • research two or more forest management plans having different goals, and identify components of Integrated Resource Planning (IRP) that are present in each; e.g.: <ul style="list-style-type: none"> – forest protection – access management – harvest planning – range management – wildlife management • develop a plan for the integrated use of a local forested area; e.g.: <ul style="list-style-type: none"> – conduct research – generate alternatives – agree to a workable solution. 	<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> • Activity 5.1–Forest Perspectives • Activity 5.2–Decisions for Change • Activity 5.5–Integrated Resource Management.

MODULE CURRICULUM AND ASSESSMENT STANDARDS:

SECTION F: ADVANCED LEVEL

The following pages define the curriculum and assessment standards for the advanced level of Forestry.

Advanced level modules demand a higher level of expertise and help prepare students for entry into the workplace or a related post-secondary program.

Module FOR3010: Issues in Forestry	F.3
Module FOR3060: Measuring the Forest 3 (Survey Applications)	F.7
Module FOR3070: The Forest Marketplace	F.11
Module FOR3080: Forest Technology Applications	F.17
Module FOR3090: Forest Ecology 2 (Silvics & Succession)	F.21
Module FOR3110: Silviculture (Growing the Forest)	F.27
Module FOR3120: Integrated Resource Management (Balancing Needs)	F.33

MODULE FOR3010: ISSUES IN FORESTRY

Level: Advanced

Theme: Social and Cultural Perspectives

Prerequisite: None

Module Description: Students analyze current local and global issues in forest management, and demonstrate individual and shared actions that foster environmental stewardship.

Module Parameters: Access to information available from government, industry and community organizations (e.g., special-interest groups) regarding current forestry issues.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none">describe alternatives and consequences associated with current issues in forest management	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none">for each of <u>five</u> current issues in forest management, identifying and explaining three or more:<ul style="list-style-type: none">– immediate and/or long-term consequences– possible alternatives for dealing with the issue.Consequences and alternatives to address social, economic and environmental perspectives. <p><i>Assessment Tool</i> <i>Issues in Forestry: Analyzing Issues, FOR3010–1</i> <i>Assessment Framework: Issue Analysis, CTSISS</i></p> <p><i>Standard</i> <i>Analyze five issues to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none">a critique of one newspaper/magazine article or video documentary regarding an issue in forest management. Critique to address:<ul style="list-style-type: none">– range of viewpoints/biases evident– validity/reliability of information presented– recommended course of action. <p><i>Assessment Tool</i> <i>Issues in Forestry, FOR3010–1</i> <i>Guide to Critiquing Media Information, FORMED</i></p> <p><i>Standard</i> <i>Critique one piece of media information to a standard of 3 on the rating scale</i></p>	30

MODULE FOR3010: ISSUES IN FORESTRY (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> compare and contrast issues and trends involving Canada's forests with similar issues and trends in other parts of the world 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> completing a research project on an international forest issue. Research to provide: <ul style="list-style-type: none"> an explanation of the issue, including the stakeholders involved and their respective points of view positive and negative consequences for the forest resource and society a comparison of the issue with a similar forest issue in Canada suggested strategies/actions for dealing with the issue at local and global levels. <p><i>Assessment Tool</i> <i>Issues in Forestry, FOR3010-1</i> <i>Assessment Framework: Research Process, CTSRES</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 3 on the rating scale</i></p>	30
	<ul style="list-style-type: none"> demonstrate individual and shared actions that foster the sustainable management of forested regions <ul style="list-style-type: none"> providing a summary of the goals and accomplishments of one environmental conservation group. <p><i>Assessment Tool</i> <i>Issues in Forestry, FOR3010-1</i></p> <p><i>Standard</i> <i>Summarize goals/accomplishments to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> given a current issue in forest management: <ul style="list-style-type: none"> negotiating and debating the issue while assuming the role of one or more stakeholder groups through group consensus building, developing and presenting a shared agreement on a preferred course of action for dealing with the issue. <p><i>Assessment Tool</i> <i>Issues in Forestry, FOR3010-1</i> <i>Negotiation and Debate: Advanced Level, FORNEG-3</i></p> <p><i>Standard</i> <i>Negotiate and present and shared agreement to a standard of 3 on the rating scale</i></p>	40

MODULE FOR3010: ISSUES IN FORESTRY (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
Issues Involve Alternatives	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe past and present trends in the consumptive and non-consumptive use of forests analyze differing points of view regarding how and to what degree Canada's forests should be used identify positive and negative effects of forest industry development on people, industry and the environment describe and assess the pros and cons of different forest harvesting practices; e.g.: <ul style="list-style-type: none"> clearcutting selective harvesting describe issues related to the expansion and management of Alberta's forest industry; e.g.: <ul style="list-style-type: none"> access management herbicide use in timber management old-growth management maintenance of biodiversity describe ways in which different forest stakeholders make use of the judicial, legislative and regulatory systems in working toward their objectives. 	<p>Gather appropriate resource materials <u>prior</u> to beginning the module.</p> <p>Discuss issues from a variety of perspectives (e.g., social, economic, environmental).</p> <p>Discuss different perspectives regarding how and to what degree Canada's forests should be used.</p> <p>Analyze pros and cons related to different forest harvest practices.</p> <p>Identify issues regarding the expansion of forest management in Alberta.</p>

MODULE FOR3010: ISSUES IN FORESTRY (continued)

Concept	Specific Learner Expectations	Notes
Global Issues and Trends	<p><i>The student should:</i></p> <ul style="list-style-type: none"> compare issues involving Canada's forests with similar issues in other parts of the world; e.g.: <ul style="list-style-type: none"> land use expansion of the forest industry forest renewal processes management of old-growth forests climate change and forest ecosystems extensive versus intensive management describe global impacts of the recreational and commercial use of forests; e.g.: <ul style="list-style-type: none"> social and cultural economic environmental infer the long-range effects of the sustainable use of forests in Canada and other parts of the world. 	Research a forest issue of significance in another country. Compare and contrast with the Canadian situation.
Individual and Shared Actions	<ul style="list-style-type: none"> compare and contrast different philosophies, ethics and alternatives regarding the forest resource and how best to ensure its health and sustainability describe the goals and objectives of one or more forest conservation or preservation groups explain a global issue regarding the consumptive and/or non-consumptive use of forests; e.g.: <ul style="list-style-type: none"> conduct research develop a position participate in debate identify a plan for the use of a forested region; e.g.: <ul style="list-style-type: none"> conduct research generate alternatives agree to a plan that meets an acceptable level of needs initiate responsible and ethical actions in relation to the forest and its many resources; e.g.: <ul style="list-style-type: none"> individual actions shared actions leadership roles. 	<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> Activity 3.6—An Urban Wilderness at School Activity 5.1—Forest Values Activity 5.3—Forest Perspectives. <p>Plan learning activities that emphasize and develop strategies for <u>empowerment</u>.</p>

MODULE FOR3060: MEASURING THE FOREST 3 (SURVEY APPLICATIONS)

Level: Advanced

Theme: Technology and Applications

Prerequisite: FOR2060 Measuring the Forest 2 (Sampling Techniques)

Module Description: Students explain management applications of data collected from a forest survey, and examine the role of technology in current forest inventory practices.

Module Parameters: Access to forest inventory technology and forest survey data available from government and industry organizations (e.g., Alberta Environmental Protection, Canadian Forestry Service, Canadian Centre for Remote Sensing).

Access to forestry maps available from private vendors.

Instructor knowledge of population sampling and survey design and/or relevant industry experience is an asset.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none">explain the applications of forest survey data in resource management	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none">identifying and explaining applications of timber cruise data and nonfibre data in resource management. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Forest Survey Data, FOR3060–1</i></p> <p><i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none">demonstrating applications of a sample set of forest survey data by:<ul style="list-style-type: none">identifying bias, error and other limitations in the sample dataextrapolating the data to estimate forest populationsusing the survey data to establish effective forest management practicesmodifying the sample design to increase accuracy of the survey. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Forest Survey Data, FOR3060–1</i></p> <p><i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i></p>	60

MODULE FOR3060: MEASURING THE FOREST 3 (SURVEY APPLICATIONS) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> describe the role of technology in current forest inventory practices 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> completing a research project on applications of technology in data collection, manipulation and/or storage. Research to address: <ul style="list-style-type: none"> aerial photography satellite imagery computer-based mapping systems applications of ground truthing in verifying data gathered through remote sensing. <p><i>Assessment Tool</i> <i>Research Process: Role of Technology in Forest Inventory, FOR3060-2</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> given information regarding a current forest inventory research project (e.g., an Alberta Research Council project, an initiative of the Canadian Forestry Service), a presentation or report that summarizes: <ul style="list-style-type: none"> the research problem/question research design and expected results accomplishments and challenges encountered to date immediate and long-range implications of the research project. <p><i>Assessment Tool</i> <i>Presentations/Reports: Advanced Level, FORPRE-3</i></p> <p><i>Standard</i> <i>Complete the presentation or report to a standard of 3 on the rating scale</i></p>	<p>30</p>
<ul style="list-style-type: none"> explain career opportunities relevant to forest measurement 	<ul style="list-style-type: none"> given current information on career opportunities in forest measurement (e.g., labourer, technician, professional worker), completing a research project on one or more related careers. <p><i>Assessment Tool</i> <i>Career Search: Advanced Level, FORCAR-3</i></p> <p><i>Standard</i> <i>Conduct research to a standard of 3 on the rating scale</i></p>	<p>10</p>

MODULE FOR3060: MEASURING THE FOREST 3 (SURVEY APPLICATIONS) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
Data Interpretation	<p><i>The student should:</i></p> <ul style="list-style-type: none"> explain applications of timber cruise data in resource management; e.g.: <ul style="list-style-type: none"> estimating total fibre volume projecting future forest growth planning harvest operations explain applications of nonfibre data in resource management; e.g.: <ul style="list-style-type: none"> monitoring water and soil quality determining potential for agriculture/recreation monitoring wildlife population densities and trends planning conservation practices interpret a set of sample forest survey data; e.g.: <ul style="list-style-type: none"> consider bias, error and other limitations in the sample data extrapolate the data to estimate forest populations suggest applications of data in resource management consider modification to sample design that may increase accuracy of the survey. 	<p>Contact resource persons from:</p> <ul style="list-style-type: none"> Canadian Forestry Service (Natural Resources Canada) Land and Forest Services (Alberta Environmental Protection). <p>Perform mathematical calculations to determine timber volumes.</p> <p>Obtain sample data from local government/industry.</p> <p>Use paper and pencil <u>OR</u> computer programs to interpret data.</p> <p>Supplementary sources of information on forest measurement include:</p> <ul style="list-style-type: none"> <i>Natural Resources Measurements</i> by Thomas Avery (McGraw Hill Book Co., 1975) <i>Forest Mensuration</i> (3rd Edition) by Bertram Husch, Charles Miller and Thomas Beers (John Wiley and Sons Inc., 1982).

MODULE FOR3060: MEASURING THE FOREST 3 (SURVEY APPLICATIONS) (continued)

Concept	Specific Learner Expectations	Notes
Role of Technology	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe applications of technology in gathering and storing data about the forest resource; e.g.: <ul style="list-style-type: none"> aerial photography satellite imagery computer-based mapping systems explain the importance of ground truthing in verifying data gathered through remote sensing predict forest inventory technologies and practices in the future outline the objectives of a current forest inventory research project; e.g.: <ul style="list-style-type: none"> an initiative of the Canadian Forestry Service an Alberta Research Council project. 	<p>Acquaint students with current applications of technology through field studies.</p> <p>Contact the following agencies for information on current information-gathering technologies:</p> <ul style="list-style-type: none"> <i>Canadian Centre for Remote Sensing</i> (Ottawa, Ontario) <i>RADARSAT International</i> (Richmond, B.C.). <p>Research the future use of computers and recent developments in Geographic Information Systems (GIS).</p> <p>Investigate potential applications of Global Positioning Systems (GPS).</p>
Career Opportunities	<ul style="list-style-type: none"> outline potential careers and the range of occupational opportunities in forest measurement summarize and present the results of research on one or more career opportunities in forest measurement; e.g.: <ul style="list-style-type: none"> nature of the work number of workers/employment trends entry requirements/competencies education/training opportunities opportunity for advancement. 	<p>Review National Occupational Profiles (NOC).</p> <p>Interview persons involved in conducting forest inventories.</p> <p>Provide opportunities for work experience and job shadowing.</p>

MODULE FOR3070: THE FOREST MARKETPLACE

Level: Advanced

Theme: Technology and Applications

Prerequisite: None

Module Description: Students describe the range of consumer products and services derived from Canada's forests, and research the production and marketing of these forest products.

Module Parameters: Access to resources available from forest products and forest service industries.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> describe fibre and nonfibre products and services derived from Canada's forests 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> given a range of relevant in-school/community resources, identifying and describing: <ul style="list-style-type: none"> fibre and nonfibre products and services derived from Alberta's forests forecasts regarding the future use of forests in Alberta and Canada. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Forest Products and Services, FOR3070-1</i></p> <p><i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i></p>	10
<ul style="list-style-type: none"> explain processes used in developing fibre and nonfibre forest products and services in Canada and Alberta 	<ul style="list-style-type: none"> preparing flow charts that depict the sequence of steps involved in developing three forest products and/or services. <p><i>Assessment Tool</i> <i>Assessment Criteria: Flow Charts, FORFLO</i></p> <p><i>Standard</i> <i>Complete flow charts to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> completing a research project on recent applications of milling and/or pulping technology in the development of one or more forest products/services. <p><i>Assessment Tool</i> <i>Research Process: Milling and/or Pulping Technology, FOR3070-2</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 3 on the rating scale</i></p>	30

MODULE FOR3070: THE FOREST MARKETPLACE (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> identify market trends, and develop a marketing plan for a forest product or service 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> developing and presenting a multimedia marketing plan for a new forest product or service. Plan to involve consideration of: <ul style="list-style-type: none"> – factors that influence market trends – product diversification and/or specialization – potential markets in North America, the Pacific Rim, Europe and two other selected regions – materials and processes involved in product/ service development – effective marketing strategies and systems. <p><i>Assessment Tool</i> <i>Assessment Criteria: A Marketing Plan, FOR3070–3</i></p> <p><i>Standard</i> <i>Develop and present the marketing plan to a standard of 3 on the rating scale</i></p>	50
<ul style="list-style-type: none"> explain career opportunities relevant to developing and marketing forest products 	<ul style="list-style-type: none"> given current information on career opportunities in developing and marketing forest products (e.g., labourer, technician, professional worker), completing a research project on one or more related careers. <p><i>Assessment Tool</i> <i>Career Search: Advanced Level, FORCAR–3</i></p> <p><i>Standard</i> <i>Conduct research to a standard of 3 on the rating scale</i></p>	10
<ul style="list-style-type: none"> demonstrate basic competencies. 	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

MODULE FOR3070: THE FOREST MARKETPLACE (continued)

Concept	Specific Learner Expectations	Notes
Products and Services	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify market-based products and services derived from Alberta's forests; e.g.: <ul style="list-style-type: none"> – primary wood products – wood-fabricated materials – wood pulp and paper products – chemical products – trapping, fishing and hunting – guiding and outfitting – tourism and recreational pursuits • identify psychological benefits and extra-market values derived from Alberta's forests; e.g.: <ul style="list-style-type: none"> – ecological values – aesthetic and spiritual values – bequest value for future generations • describe trends in the consumptive and non-consumptive use of forests in Canada and Alberta; e.g.: <ul style="list-style-type: none"> – recreation – trapping – logging – oil and gas development. 	<p>Contact the Alberta Forest Products Association for current resources and information.</p> <p>See <i>Alberta's Focus on Forests</i> (Activity 4.2–Products From Canada's Forests).</p> <p>Identify major industries that require wood.</p> <p>Identify common products derived from a selected tree species.</p> <p>Identify a range of forest products and services that could be derived from a selected site.</p> <p>Supplementary sources of information include:</p> <ul style="list-style-type: none"> • <i>A Forest Journey - The Role of Wood in the Development of Civilization</i> (Harvard University Press) • <i>Canadian Forestry - The View Beyond the Trees</i> (Macmillan of Canada).
Processing	<ul style="list-style-type: none"> • identify and sequence the steps that are involved in producing a fibre commodity; e.g.: <ul style="list-style-type: none"> – harvest and transportation – processing techniques – grading, packing and storage • identify materials and services that are required at each stage in the production of a fibre commodity; e.g.: <ul style="list-style-type: none"> – human and natural resources – energy and technologies – inspection and regulation 	<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> • Activity 4.4–From Pulp to Paper and Back Again • Activity 4.5–Pulp and Paper: The Technology–Environment Connection. <p>Draw posters that depict the journey of a tree from stump to consumer.</p>

MODULE FOR3070: THE FOREST MARKETPLACE (continued)

Concept	Specific Learner Expectations	Notes
Processing (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe recent developments in milling and pulping technology and their impact on the forest industry; e.g.: <ul style="list-style-type: none"> fibre utilization environmental stewardship identify new and emerging products and services derived from Alberta's forests; e.g.: <ul style="list-style-type: none"> cattle food methane gas. 	
Marketing Systems and Trends	<ul style="list-style-type: none"> describe the nature and extent of Canada's market share in North America, the Pacific Rim, Europe and other locations describe systems used to market Canada's forest products and services at local, national and international levels identify social, economic and environmental factors that influence consumer trends and market demands for forest products and services describe the impact of developing technologies on Canada's fibre and nonfibre forest products; e.g.: <ul style="list-style-type: none"> efficiency of production processes improved utilization focus on value-added and knowledge intensive commodities identify market opportunities that arise from product diversification and specialization, international trade and participation in a global economy create a plan for identifying new market opportunities, developing a forest product, and managing the venture. 	<p>Marketing modules in the Agriculture strand and Management and Marketing strand offer additional instructional strategies.</p> <p>View <i>Dr. Suess: The Lorax</i>, a video that addresses environmental issues in marketing (available from the National Film Board or your local Urban/Regional Resource Centre).</p> <p>Visit a sawmill and wood-product distributor to examine traditional and new uses of wood.</p> <p>Prepare a venture plan for Christmas tree production and marketing.</p>

MODULE FOR3070: THE FOREST MARKETPLACE (continued)

Concept	Specific Learner Expectations	Notes
Career Opportunities	<p><i>The student should:</i></p> <ul style="list-style-type: none">• outline potential careers and the range of occupational opportunities in developing and marketing forest products• present the results of research on one or more careers involving the production and/or marketing of forest products; e.g.:<ul style="list-style-type: none">– nature of the work– number of workers/employment trends– entry requirements/competencies– education/training opportunities– opportunity for advancement.	<p>Review National Occupational Profiles (NOC).</p> <p>Interview persons involved in the production and marketing of forest products.</p> <p>Provide opportunities for work experience and job shadowing.</p>

MODULE FOR3080: FOREST TECHNOLOGY APPLICATIONS

Level: Advanced

Theme: Technology and Applications

Prerequisite: None

Module Description: Students examine research and technological applications in the forest industry, and examine changing career opportunities in the forestry sector.

Module Parameters: Access to resources available from relevant industry and government organizations (e.g., Alberta Environmental Protection, Canadian Forestry Service, Alberta Research Council).

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none">describe different areas of forest research presently being conducted in Canada and Alberta	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none">identifying major areas of forest research being conducted in Canada and, where possible, Alberta. <p><i>Assessment Tool</i> <i>Forest Technology Applications, FOR3080–1</i></p> <p><i>Standard</i> <i>Identify six major areas of forest research to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none">given information regarding a current forest research project in Canada (e.g., enhanced utilization, forest management), summarizing:<ul style="list-style-type: none">research objectives and participating agenciesinformation-gathering strategiesproject status and implications for forest industry. <p><i>Assessment Tool</i> <i>Forest Technology Applications, FOR3080–1</i> <i>Presentations/Reports, FORPRE–3</i></p> <p><i>Standard</i> <i>Summarize <u>one</u> current forest research project to a standard of 3 on the rating scale</i></p>	30

MODULE FOR3080: FOREST TECHNOLOGY APPLICATIONS (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • cite examples of current and emerging technologies used in the forest industry 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • completing a research project on three technologies and their application in different sectors of the forest industry (e.g., greenhouse/nursery operations, silviculture, forest harvest, wood production/utilization, forest inventory/protection). For each technology, research to address: <ul style="list-style-type: none"> – specific problems/needs being addressed – basic components and principles of operation – advantages/disadvantages with respect to social, economic and environmental factors. <p><i>Assessment Tool</i> <i>Forest Technology Applications, FOR3080–1</i> <i>Sample Research Topics: Technology Application, FOR3080–2</i> <i>Research Process, CTSRES</i></p> <p><i>Standard</i> <i>Complete research on <u>three</u> technologies to a standard of 3 on the rating scale</i></p>	50
<ul style="list-style-type: none"> • explain career opportunities and trends relevant to the forestry sector 	<ul style="list-style-type: none"> • given current information on career opportunities and trends in the forestry sector, completing a research project on one or more related career clusters. <p><i>Assessment Tool</i> <i>Forest Technology Applications, FOR3080–1</i> <i>Career Search: Advanced Level, FORCAR–3</i></p> <p><i>Standard</i> <i>Complete research to a standard of 3 on the rating scale</i></p>	20
<ul style="list-style-type: none"> • demonstrate basic competencies. 	<ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

MODULE FOR3080: FOREST TECHNOLOGY APPLICATIONS (continued)

Concept	Specific Learner Expectations	Notes
Research	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify and describe different areas of forest research being conducted in Canada and Alberta; e.g.: <ul style="list-style-type: none"> – silviculture – harvesting systems – forest products – forest protection – wildlife inventories – ecological studies – integrated resource management • compare the goals and priorities of local agencies whose mandate is to conduct research related to forestry and forest ecosystems; e.g.: <ul style="list-style-type: none"> – individuals – corporations – colleges and universities – government agencies • explain the role of the Alberta Forest Research Advisory Council in coordinating forest research activities in Alberta • describe applications of data banks and information systems in making forest management decisions • identify major components of a research plan for the enhanced utilization and/or management of forests; e.g.: <ul style="list-style-type: none"> – goals and objectives of the plan – economic, political, scientific and related factors – methodologies and strategies – outcomes and types/kinds of data obtained – limitations of the plan, or information that may be lacking or incomplete. 	Contact the Canadian Forestry Service (Natural Resources Canada) for current information (see Section I: Learning Resource Guide).
Technologies	<ul style="list-style-type: none"> • describe past and present applications of technology in the forest industry; e.g.: <ul style="list-style-type: none"> – greenhouse and nursery operations – silviculture – harvesting technologies – wood production and utilization – biotechnology 	

MODULE FOR3080: FOREST TECHNOLOGY APPLICATIONS (continued)

Concept	Specific Learner Expectations	Notes
Technologies (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe emerging applications of technology in the forest industry; e.g.: <ul style="list-style-type: none"> pulping procedures effluent treatment and pollution control describe the advantages and disadvantages of a recent technology designed to enhance our utilization and/or management of forests; e.g.: <ul style="list-style-type: none"> social economic environmental. 	
Career Trends	<ul style="list-style-type: none"> predict ways in which research, technology, social values and land use priorities may affect forest industries in the future predict future careers and occupational opportunities within the forestry sector, and the education/training that may be required to gain employment and advance in related fields describe general career areas and the range of occupational opportunities available within each; e.g.: <ul style="list-style-type: none"> forest inventory forest biology/ecology forest protection forest harvest forest products industry forest management describe one or more employment opportunities in forestry; e.g.: <ul style="list-style-type: none"> job description/working conditions entry requirements/competencies educational/training opportunities opportunity for advancement opportunity for self-employment and entrepreneurship. 	<p>Review National Occupational Profiles (NOC).</p> <p>Contact the "Career Hotline" (telephone 1-800-661-3753).</p> <p>Interview persons employed in the forestry sector.</p>

MODULE FOR3090: FOREST ECOLOGY 2 (SILVICS & SUCCESSION)

Level: Advanced

Theme: Management and Conservation

Prerequisites: FOR1090 Forest Ecology 1 (Ecosystem Dynamics) or Biology 20
Emergency First Aid (current certification)

Module Description: Students investigate the interrelationships among soil, water, air, trees and the environment, and explain how forests change over time as a result of these interrelationships.

Module Parameters: Access to a forest environment.

Instructor training (current certification) in Standard Level First Aid is required.

See Section C (Planning for Instruction) and Section H (Linkages/Transitions) for further information on instructor training and certification.

Supporting Modules: AGR2120 and AGR3120 Soils Management 1 and 2

Students must have a general knowledge of basic first aid and survival techniques relevant to a forest environment prior to engaging in field-based investigations. See Planning for Instruction in Section C for further information on student safety.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none">explain the effects of soil, air and water characteristics on forest ecosystems	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none">identifying and describing:<ul style="list-style-type: none">organic and inorganic components of forest soils and their function in forest ecosystemsmajor types of air pollutants and their affect on forest ecosystems. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Soil, Air and Water Characteristics, FOR3090–1</i></p> <p><i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i></p>	40

MODULE FOR3090: FOREST ECOLOGY 2 (SILVICS & SUCCESSION) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> identify factors that determine the presence of tree species and forest ecosystems in particular environments 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> conducting field investigations on the effects of soil pH, temperature and water quantity on plant growth. <p><i>Assessment Tool</i> <i>Field Investigations: Soil, Air and Water Characteristics, FOR3090-2</i></p> <p><i>Standard</i> <i>Conduct field investigation to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> describing causal relationships and making inferences regarding the effects of: <ul style="list-style-type: none"> local forests on soil, water, weather and biotic factors global forests on global climate. <p><i>Assessment Tool</i> <i>Guide to Inferences: Forest Ecosystems, FOR3090-3</i></p> <p><i>Standard</i> <i>Make <u>ten</u> inferences (as outlined in FOR309-3) to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> completing a field-based research project on forest associations. Research to include: <ul style="list-style-type: none"> the silvics of five common Alberta tree species, including climatic, soil and moisture requirements the structural characteristics and environments of three common Alberta forest associations, and factors that have determined their existence. <p><i>Assessment Tools</i> <i>Research Process: Forest Associations, FOR3090-4</i> <i>Alberta's Focus on Forests (Section 3.1: A Lot Depends on Location)</i> <i>Common Forest Associations in Alberta, FOR3090-5</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 3 on the rating scale</i></p>	<p>30</p>

MODULE FOR3090: FOREST ECOLOGY 2 (SILVICS & SUCCESSION) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> explain the process of change in a forest environment 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> given access to a local forest environment, identifying on-site: <ul style="list-style-type: none"> four living agents of change four nonliving agents of change two examples of succession. <p><i>Assessment Tool</i> Alberta's Focus on Forests (<i>Section 1.6: Change in Forest Ecosystems</i>) <i>Identification Guide: Agents of Change, FOR3090-6</i></p> <p><i>Standard</i> Address all criteria in the identification guide to a standard of 3 on the rating scale</p> <ul style="list-style-type: none"> making inferences regarding structural and/or behavioural adaptations of living organisms to particular changes in a forest environment. <p><i>Assessment Tool</i> <i>Guide to Inferences: Forest Ecosystems, FOR3090-3</i></p> <p><i>Standard</i> Make <u>four</u> inferences (as outlined in FOR3090-3) to a standard of 3 on the rating scale</p>	<p>30</p>
<ul style="list-style-type: none"> demonstrate basic competencies. 	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

MODULE FOR3090: FOREST ECOLOGY 2 (SILVICS & SUCCESSION) (continued)

Concept	Specific Learner Expectations	Notes
Forest Ecosystems	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe physical characteristics used to classify forest soils, and the effect of different soils on plant growth; e.g.: <ul style="list-style-type: none"> texture porosity explain the function of organic and inorganic components of forest soils; e.g.: <ul style="list-style-type: none"> micro- and macro-organisms gases and minerals organic matter water describe the effects of soil acidity, alkalinity and temperature on the growth of trees and other forest plants describe indicators of water quantity in the forest, and its effects on trees and other plants; e.g.: <ul style="list-style-type: none"> surface water ground water describe the effects of known air pollutants on forest ecosystems; e.g.: <ul style="list-style-type: none"> ozone particulate matter oxides and nitrogen sulphur dioxide describe the effects of a forest on the local environment; e.g.: <ul style="list-style-type: none"> soil and water weather wildlife infer the effects of forests worldwide on global climates. 	<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> Activity 1.4–How Forests Affect the Environment Activity 1.5–Biosphere. <p>Investigate soil characteristics by digging a soil pit.</p> <p>Analyze soil samples using a soil test kit.</p> <p>Design and perform experiments that monitor the effects of soil composition, air quality and water quality on tree growth.</p> <p>For additional information, obtain <i>Diagnosis of Air Pollutant and Natural Stress Symptoms on Forest Vegetation in Western Canada</i> (available at no cost from the Canadian Forestry Service, Natural Resources Canada).</p> <p>Measure/infer rates of transpiration and subsequent effect on weather and wildlife.</p>

MODULE FOR3090: FOREST ECOLOGY 2 (SILVICS & SUCCESSION) (continued)

Concept	Specific Learner Expectations	Notes
Forest Associations	<p><i>The student should:</i></p> <ul style="list-style-type: none"> explain how each tree species has unique site and climatic requirements that determine its ability to grow in particular environments describe the general characteristics, life history, site and climatic requirements of five Alberta tree species; e.g.: <ul style="list-style-type: none"> tree form growth patterns and life cycle soil moisture aspect and elevation describe the general structural characteristics and environments of some common forest associations in Alberta; e.g.: <ul style="list-style-type: none"> soil moisture position on slope. 	<p>Conduct field trips to classify growth sites.</p> <p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> Activity 2.4–Differences in Design Activity 3.1–A Lot Depends on Location. <p>Discuss the “most likely site” to find a particular tree species.</p>
Forest Change	<ul style="list-style-type: none"> identify living and nonliving agents of change in a local forest environment infer structural and/or behavioural adaptations of living organisms to particular changes in the forest environment; e.g.: <ul style="list-style-type: none"> adaptations to site conditions reproductive adaptations describe the impacts of specific environmental changes on a forest community; e.g.: <ul style="list-style-type: none"> short-term consequences long-term consequences give examples of primary and secondary successional stages in a local forest environment describe Alberta’s natural forest history; e.g.: <ul style="list-style-type: none"> role of fire role of other agents. 	<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> Activity 1.6–Change in Forest Ecosystems Activity 3.5–Controlling Fire <p>Relate to forest associations.</p> <p>Example: aspen/spruce understorey.</p> <p>Visit a mature forest and clearcut area. Compare and contrast the two areas and make predictions for each forest environment in five years.</p>

MODULE FOR3110: SILVICULTURE (GROWING THE FOREST)

Level: Advanced

Theme: Management and Conservation

Prerequisite: None

Module Description: Students demonstrate knowledge of the techniques used to establish, grow and harvest tree crops.

Module Parameters: Access to a demonstration forest.

Off-campus learning may support the development of knowledge and skills in stand establishment and tending practices; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education, 1997) for further information regarding off-campus learning.

Supporting Module: CTR2210 Workplace Safety (Practices) [Career Transitions Strand]

Students must have a general knowledge of potential hazards and accepted safety practices relevant to stand management prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C for further information on student safety.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none">describe silviculture and the silvics of Alberta tree species	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none">identifying and describing:<ul style="list-style-type: none">major components of silviculture, including stand establishment, stand management and harvestthe silvics of five Alberta tree species. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Silviculture, FOR3110-1</i> <i>Sample Format: Silvics of a Tree Species, FOR3110-2</i></p> <p><i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i></p>	20

MODULE FOR3110: SILVICULTURE (GROWING THE FOREST) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate practices used to establish a stand of trees and manipulate growing conditions to favour particular species 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> conducting laboratory and/or field-based investigations that demonstrate regeneration by: <ul style="list-style-type: none"> natural methods, including natural seed supply and vegetative reproduction artificial methods, including direct seeding, bare-root and container seedlings. <p><i>Assessment Tool</i> <i>Lab Investigations: Natural and Artificial Regeneration, FOR3110-3</i> <i>Observation Checklist for Field-based Investigations, FOROBS</i></p> <p><i>Standard</i> <i>Conduct lab investigations to a standard of 3 on the rating scale <u>and/or</u> complete all sections of the observation checklist for field-based investigations</i></p> <ul style="list-style-type: none"> a teacher-prepared assessment in which the student demonstrates knowledge of practices used to establish and manage a stand of trees. <p><i>Assessment Tool</i> <i>Sample Assessment Items: Stand Establishment and Management, FOR3110-4</i></p> <p><i>Standard</i> <i>Response indicating 80% mastery</i></p>	<p>60</p>

MODULE FOR3110: SILVICULTURE (GROWING THE FOREST) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> demonstrating (or explaining) practical field techniques used to establish and tend a stand of trees. Tasks to include: <ul style="list-style-type: none"> – site preparation – cone collection and seed extraction – planting stock – spacing, thinning, pruning, fertilizer use. <p><i>Assessment Tool</i> <i>Task Checklist: Stand Establishment and Tending, FOR3110–5</i> <i>Lab Assessment: Outdoor Forest Experiences, FORLAB</i> <i>Observation Checklist for Field-based Investigations, FOROBS</i></p> <p><i>Standard</i> <i>Achieve a performance rating of :</i> <ul style="list-style-type: none"> – 2 in areas identified on the task checklist – 3 in applicable areas of lab assessment. <i>Complete all sections of the observation checklist for field-based investigations</i></p>	
<ul style="list-style-type: none"> describe and compare methods of harvesting tree species 	<ul style="list-style-type: none"> given access to current publications on harvest methods (e.g., clearcutting, seed tree, shelterwood, selection), completing a research project on: <ul style="list-style-type: none"> – the benefits and costs of different methods of harvest – appropriate methods of harvest (as determined by silvics) for each of seven Alberta tree species. <p><i>Assessment Tool</i> <i>Research Process: Forest Harvest Methods, FOR3110–6</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 3 on the rating scale</i></p>	10
<ul style="list-style-type: none"> explain career opportunities relevant to silviculture 	<ul style="list-style-type: none"> given current information on career opportunities in silviculture (e.g., labourer, technician, professional worker), completing a research project on one or more related careers. <p><i>Assessment Tool</i> <i>Career Search: Advanced Level, FORCAR–3</i></p> <p><i>Standard</i> <i>Conduct research to a standard of 3 on the rating scale</i></p>	10

MODULE FOR3110: SILVICULTURE (GROWING THE FOREST) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above.</i></p>	<p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Silviculture and Silvics</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> define silviculture identify major components of silvicultural systems; e.g.: <ul style="list-style-type: none"> stand establishment stand management harvest and re-establishment explain how individual tree species have unique ecological requirements that determine suitable silvicultural practices compare and contrast the ecological requirements and silvics for two or more Alberta tree species describe one or more research programs designed to improve silvicultural practices; e.g.: <ul style="list-style-type: none"> genetic selection geographic information systems harvesting operations. 	<p>Discuss silviculture as the science and art of growing and tending forest crops to obtain more and better benefits from forests including wood.</p> <p>Invite a professional forester to explain components of silviculture.</p>

MODULE FOR3110: SILVICULTURE (GROWING THE FOREST) (continued)

Concept	Specific Learner Expectations	Notes
Regeneration and Stand Treatment	<p><i>The student should:</i></p> <ul style="list-style-type: none"> demonstrate methods of regeneration where seedlings are established by natural methods; e.g.: <ul style="list-style-type: none"> naturally supplied seeds vegetative reproduction demonstrate methods of regeneration where seedlings are established by artificial methods; e.g.: <ul style="list-style-type: none"> planting bare-root and container seedlings broadcasting seeds compare natural methods of regeneration with artificial methods demonstrate techniques for site preparation and the care and planting of seeds and seedlings demonstrate intermediate stand tending techniques; e.g.: <ul style="list-style-type: none"> cleaning thinning pruning fertilizing protecting identify safety practices and policies relevant to site preparation, tree planting and stand tending distinguish between intensive and extensive stand management practices. 	<p>Contact Land and Forest Services (Alberta Environmental Protection) prior to module delivery for information regarding:</p> <ul style="list-style-type: none"> seedling availability tour sites equipment availability. <p>See <i>Alberta's Focus on Forests</i> (Activity 5.4—Reforestation: Forests or Tree Farms).</p> <p>Plan for practical field experiences in establishing a stand of trees and manipulating growing conditions to favour particular species.</p> <p>Opportunities may also exist for practical field experiences in seed collection and tree planting.</p> <p>Consider linking silviculture activities with school fundraising initiatives.</p> <p>Grow container plants and apply different levels of fertilization.</p> <p>Compare the nutrient requirements of young and mature stands.</p>

MODULE FOR3110: SILVICULTURE (GROWING THE FOREST) (continued)

Concept	Specific Learner Expectations	Notes
Cutting Methods	<p><i>The student should:</i></p> <ul style="list-style-type: none"> identify factors important in choosing a suitable method of harvest; e.g.: <ul style="list-style-type: none"> growth characteristics intended utilization regeneration of species describe current applications of different methods of harvesting trees; e.g.: <ul style="list-style-type: none"> clearcutting method seed tree method shelterwood method selection method compare different methods of harvesting trees relate appropriate harvest methods to individual tree species. 	<p>See <i>Alberta's Focus on Forests</i> (Activity 4.6–Cutting Styles).</p> <p>For additional information, obtain <i>Timber Harvesting Guidelines</i> (available from Land and Forest Services, Alberta Environmental Protection).</p> <p>Select three or more sites that exhibit different timber characteristics. Examine each site to determine timber condition and relevant harvest considerations.</p>
Career Opportunities	<ul style="list-style-type: none"> outline potential careers and the range of occupational opportunities in silviculture: <ul style="list-style-type: none"> professional technical labour-based present the results of research on one or more employment opportunities in silviculture; e.g.: <ul style="list-style-type: none"> nature of the work number of workers/employment trends entry requirements/competencies education/training opportunities opportunity for advancement. 	<p>Review National Occupational Profiles (NOC).</p> <p>Interview persons involved in silviculture practices.</p> <p>Provide opportunities for work experience and job shadowing.</p>

MODULE FOR3120: INTEGRATED RESOURCE MANAGEMENT (BALANCING NEEDS)

Level: Advanced

Theme: Management and Conservation

Prerequisite: FOR2120 Users in the Forest

Module Description: Students develop and present an integrated plan for sustainable development of the forest resource.

Module Parameters: Access to government, industry and community organizations responsible for sustainable forest management and environmental stewardship (e.g., Alberta Environmental Protection, Alberta Forest Products Association, special-interest groups).

Note: This is a summative module that requires prior knowledge of the principles of sustainable management. It should be the last module studied in a series of Forestry modules.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<i>The student will:</i> <ul style="list-style-type: none">describe basic forest management principles	<i>Assessment of student achievement should be based on:</i> <ul style="list-style-type: none">definitions and Alberta examples of sustainable development, sustained yield, integrated land use and multiple use management. <i>Assessment Tool</i> <i>Knowledge/Application Assessment: Forest Management Principles, FOR3120-1</i> <i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i>	10

MODULE FOR3120: INTEGRATED RESOURCE MANAGEMENT (BALANCING NEEDS)
(continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> develop a plan for sustainable development and integrated use of forested land 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> developing and presenting a plan for the sustainable development and integrated use of a forested region. Plan to address: <ul style="list-style-type: none"> short- and long-term goals and objectives the views of relevant stakeholder groups a process for public involvement proposed management standards and guidelines a schedule of development activities forest boundaries, access, physical features, cover and other resources permits, licences and/or other legal agreements that may be required a strategy for monitoring use and resolving potential conflicts. <p><i>Assessment Tools</i> <i>Assessment Criteria: Developing a Forest Management Plan, FOR3120-2</i> <i>Presentations/Reports: Advanced Level, FORPRE-3</i></p> <p><i>Standard</i> <i>Achieve a minimum performance rating of:</i> <ul style="list-style-type: none"> 2 in developing the management plan 3 in presenting the management plan </p>	90
<ul style="list-style-type: none"> demonstrate basic competencies. 	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

Concept	Specific Learner Expectations	Notes
Basic Principles	<p><i>The student should:</i></p> <ul style="list-style-type: none"> explain sustainable development and sustained yield within the context of Canada's forests compare principles of integrated land use with principles of multiple use management by citing examples of each within Alberta describe local opportunities for consultation and public involvement in forest management decisions. 	<p>This is a summative module that requires background knowledge of the principles of forestry. It should be the last module studied in a sequence of Forestry modules.</p>

MODULE FOR3120: INTEGRATED RESOURCE MANAGEMENT (BALANCING NEEDS)
(continued)

Concept	Specific Learner Expectations	Notes
Planning Process	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify short- and long-term goals for the management of forested land on an integrated basis; e.g.: <ul style="list-style-type: none"> – recreation – forage – wildlife habitat – wood fibre – oil and gas • identify scientific, economic and social factors to be addressed through the management plan; e.g.: <ul style="list-style-type: none"> – the objectives of different stakeholders – relevant government acts and regulations – forest inventory requirements – the silvics of tree species and appropriate harvest methods – consumer trends and markets for forest products – potential applications of research and technology • survey the views of different stakeholders in the forest and resolve conflicts that may arise; e.g.: <ul style="list-style-type: none"> – recreational – environmental – aboriginal – industrial – agricultural • incorporate consultation with other resource users and public involvement into the planning process • identify alternative means of achieving the management goals, and select the preferred alternatives • elaborate upon permits, licences or other legal agreements that may be required 	<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> • 4.3–Forest Perspectives • Activity 5.5–Integrated Resource Management. <p>Interview a local landowner to determine long-range goals for a particular woodlot/forested region. Prepare written management plans that are consistent with the landowner's long-range goals. Compare the plans prepared with the recommendations of a professional forester.</p>

MODULE FOR3120: INTEGRATED RESOURCE MANAGEMENT (BALANCING NEEDS)
(continued)

Concept	Specific Learner Expectations	Notes
Planning Process (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • develop a set of actions and present the management plan; e.g.: <ul style="list-style-type: none"> – a general description of the forested area – long-term management objectives – short-term management objectives – proposed management standards and guidelines – a schedule of short-term development activities • prepare a map to accompany and elaborate upon the management plan; e.g.: <ul style="list-style-type: none"> – boundaries of the forested area – forest cover and other resources within the area – physical features – history of past development – road access – proposed development activities • describe techniques for monitoring the management plan to ensure that goals are being achieved. 	Specific management plans will vary, but need to address some common actions.

FORESTRY

SECTION G: ASSESSMENT TOOLS

The following pages comprise background information and strategies for assessing student achievement using the assessment tools that are listed in Sections D, E and F of this Guide.

This section of the Guide to Standards and Implementation has been designed to provide a common base of understanding about the level of competencies students are expected to demonstrate to successfully complete a module. The goal is to establish assessment standards for junior and senior high school students that are fair, credible and challenging.

These tools will assist teachers throughout the province to more consistently assess student achievement. The purpose of expanding on the assessment standards is to:

- increase confidence among students, parents, business/industry and post-secondary that students can demonstrate the competencies specified in the modules they have completed
- encourage fairness and equity in how students' efforts are judged
- enable learners to focus effort on key learnings
- support teachers and community partners in planning and implementing CTS.

The tools were validated during the optional stage of CTS implementation.

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ASSESSING STUDENT ACHIEVEMENT IN CTS

The CTS assessment standards assess two basic forms of competency:

- What can a student **do**?
 - **make** a product (e.g., wood bowl, report, garment)
 - **demonstrate** a process
 - strand-related competencies (e.g., keyboarding, hair cutting, sewing techniques, lab procedures)
 - basic competencies (e.g., resource use, safety procedures, teamwork).
- What does a student **know**?
 - knowledge base needed to demonstrate a competency (link theory and practice).

CTS Defines *Summative* Assessment Standards

The assessment standards and tools defined for the CTS modules, referenced in Sections D, E and F of this Guide, focus on the final (or summative) assessment of student achievement.

Assessment throughout the learning period (formative assessment) will continue to evaluate how students are progressing. Teachers direct and respond to students' efforts to learn—setting and marking tasks and assignments, indicating where improvement is needed, sending out interim reports, congratulating excellence, etc.

Teachers will decide which instructional and assessment strategies to apply during the formative learning period. As formative and summative assessment are closely linked, some teachers may wish to modify the tools included in this section to use during the instructional process. Teachers may also develop their own summative assessment tools as long as the standards are consistent with the minimum expectations outlined by Alberta Education.

Grading and Reporting Student Achievement

When a student can demonstrate ALL of the exit-level competencies defined for the module (module learner expectations), the teacher will designate the module as “successfully completed.” The teacher will then use accepted grading practices to determine the percentage grade to be given for the module—a mark not less than 50%.

The time frame a teacher allows a student to develop the exit-level competency is a local decision. NOTE: The Senior High School Handbook specifies that students must have access to 25 hours of instruction for each credit. Students may, however, attain the required competencies in less time and may proceed to other modules.

Teachers are encouraged to consult their colleagues to ensure grading practices are as consistent as possible.

High school teachers may wish to refer to “Directions for Reporting Student Achievement in CTS” for information on how to use the CTS course codes to report the credits that students have earned to Alberta Education. (Copies of this document have been forwarded to superintendents and senior high school principals.)

Components of Assessment Standards in CTS

The following components are included in each module:

- **module learner expectations** (in the shaded left column of the module) define the exit-level competencies students are expected to achieve to complete a module. Each MLE defines and describes critical behaviours that can be measured and observed. The student must meet the standard specified for ALL MLEs within a module to be successful.

- **suggested emphasis** (in the right column of the module) provides a guideline for the relative significance of each MLE and can be used to organize for instruction.
- **criteria and conditions** (in the middle column of the module) set the framework for the assessment of student competency, specifying the minimum standard for performance and including a reference to assessment tools, where appropriate.

Criteria define the behaviours that a student must demonstrate to meet the designated standard. For example, the criteria could describe the various techniques that must be demonstrated when using a tool, and/or describe the minimum components of a project the student must complete.

Conditions outline the specifications under which a student's competency can be judged. For example, the conditions could specify whether the assessment should be timed or not, or if the student should be allowed to access support resources or references.

Standard may be defined by (1) assessment tools, which are referenced in this section (or sometimes in approved learning resources) and/or (2) "illustrative examples" of student work, if appropriate.

Assessment Tools included in this section of the Guide tend to be of two types:

- tools generic to a strand or to the entire CTS program; e.g., a standard five-point rating scale is used in all strands. Other generic tools include assessing reports and presentations and lab safety checklists. (*Names of these tools include the strand code [e.g., "INF" for Information Processing] and a code for the type of tool [e.g., "TDENT" for Text-Data Entry].*)

- tools specific to a module; e.g., assessment checklist for assessing a venture plan in Enterprise and Innovation or a checklist for sketching, drawing and modelling in Design Studies. (*Names of these tools include the module code; e.g., "INF1010-1" indicating that it is the first module-specific tool used in Information Processing Module 1010.*)

Development and Validation Processes

The "Criteria and Conditions" and "Suggested Emphasis" columns have been validated with extensive input from teachers, professional associations/contacts and post-secondary institutions. The goal was prepare well-structured assessment standards and related assessment tools that:

- establish an appropriate level of challenge and rigour
- relate directly to the type of learning described in the curriculum standard
- are easy to understand
- are efficient to implement
- can provide a consistent measure of what was expected to be measured.

As students and teachers work with the assessment standards and tools, it is expected that levels of performance will increase as more and more students are able to achieve the minimum standard. Therefore, the assessment standards and related tools will continue to be monitored, and revised as necessary to ensure appropriate levels of rigour and challenge, and successful transitions for students as they leave high school and enter the workplace or related post-secondary programs.

ASSESSING STUDENT ACHIEVEMENT IN FORESTRY

Assessing student achievement in Forestry involves gathering information about what a student knows and is able to do, and comparing this information with learning outcomes defined by the curriculum (i.e., module learner expectations, assessment conditions and criteria, illustrative examples/reference sets).

Summative assessment for each module in Forestry will focus attention on process (e.g., how the student approaches/performs particular tasks) and product (e.g., quality characteristics of the task performed, item produced or service rendered). While there are also knowledge-based components of learning within each module, a greater emphasis has been suggested for learning that involves the transfer/ application of knowledge in task- or service-oriented situations.

Assessment Strategies and Tools

A variety of assessment tools are provided for assessing student performance within each module. Each tool communicates, through a five-point rating scale, a minimum standard for the completion of a learning task. Criteria for assessing the “basic competencies” students are expected to demonstrate throughout the learning process have been integrated with other performance criteria in each tool.

The assessment tools, when used collectively for a particular module, will assist teachers to assess successful module completion in an equitable and consistent manner. Depending on the way the classroom is organized, assessment tools may be used with individual students upon completion of specific learning tasks, or with the entire class at the end of a learning period.

Tools Generic to CTS

The generic rating scale has been used to develop several of the tools in CTS. A generic framework for assessing the processes CTS students apply in completing a task or project is included in this section. It is based on the notion that students will

follow a process as they work through their projects and that this process has a number of sequential steps. The framework shows the increasing expectations from the introductory, to the intermediate, to the advanced level.

Some assessment tools, e.g., Presentations/ Reports (CTSPRE) are generic to CTS and have been included in this section. In assessing MLEs at the introductory level, PRE100 would be used. Since the content portion of this tool must relate specifically to an MLE in a module, the tool has been adapted, labelled and included under Assessment Tools Specific to the Forestry strand, FOR, and to the module, e.g., FOR1010 (module number), and the tool number (within the module), e.g., FOR1010-1.

The Basic Competencies Reference Guide can be used directly as a checklist or as a guide to assess these competencies through other teacher-developed tools.

Tools Generic to Forestry

Assessment tools generic to Forestry have been developed to assist in assessing student performance in key areas of learning across the scope and sequence. The generic tools communicate minimum performance standards for:

- conducting research, preparing reports and making presentations
- performing practical tasks in stand establishment, tending and maintenance
- conducting laboratory and field-based investigations
- analyzing, negotiating and debating forestry- and environment-related issues
- proposing personal/shared actions that foster environmental citizenship
- exploring career trends and conducting searches of employment opportunities.

The generic tools, referenced as applicable throughout each module in the criteria and conditions column, are identified with a six- or nine-letter code (e.g., FOROBS, FORLOG-VOL). Generic tools developed for use in modules at a specific level are further identified by a number

(e.g., FORPRE–1 for introductory, FORPRE–2 for intermediate, FORPRE–3 for advanced).

Tools Specific to Forestry Modules

Other assessment tools have been developed to assess competencies that are unique to specific modules within the Forestry strand. These “module-specific” tools, also referenced in the criteria and conditions column for each module, are identified by the module number followed by a tool number (e.g., FOR1070–1 for the first module-specific tool in module FOR1070).

In some instances, authorized learning resources have been identified as assessment tools for specific modules. These learning resources usually contain test banks and other assessment strategies considered effective in establishing minimum standards for achievement.

Where appropriate, “Illustrative Examples” or “Sample Assignments/Projects” have been provided in a further attempt to communicate realistic expectations and acceptable standards of achievement.

BASIC COMPETENCIES REFERENCE GUIDE

The chart below outlines basic competencies that students endeavour to develop and enhance in each of the CTS strands and modules. Students' basic competencies should be assessed through observations involving the student, teacher(s), peers and others as they complete the requirements for each module. In general, there is a progression of task complexity and student initiative as outlined in the Developmental Framework*. As students progress through Stages 1, 2, 3 and 4 of this reference guide, they build on the competencies gained in earlier stages. Students leaving high school should set themselves a goal of being able to demonstrate Stage 3 performance.

Suggested strategies for classroom use include:

- having students rate themselves and each other
- using in reflective conversation between teacher and student
- highlighting areas of strength
- tracking growth in various CTS strands
- highlighting areas upon which to focus
- maintaining a student portfolio.

Stage 1— <i>The student:</i>	Stage 2— <i>The student:</i>	Stage 3— <i>The student:</i>	Stage 4— <i>The student:</i>
Managing Learning <ul style="list-style-type: none"> ☐ comes to class prepared for learning ☐ follows basic instructions, as directed ☐ acquires specialized knowledge, skills and attitudes ☐ identifies criteria for evaluating choices and making decisions ☐ uses a variety of learning strategies	<ul style="list-style-type: none"> ☐ follows instructions, with limited direction ☐ sets goals and establishes steps to achieve them, with direction ☐ applies specialized knowledge, skills and attitudes in practical situations ☐ identifies and applies a range of effective strategies for solving problems and making decisions ☐ explores and uses a variety of learning strategies, with limited direction	<ul style="list-style-type: none"> ☐ follows detailed instructions on an independent basis ☐ sets clear goals and establishes steps to achieve them ☐ transfers and applies specialized knowledge, skills and attitudes in a variety of situations ☐ uses a range of critical thinking skills to evaluate situations, solve problems and make decisions ☐ selects and uses effective learning strategies ☐ cooperates with others in the effective use of learning strategies	<ul style="list-style-type: none"> ☐ demonstrates self-direction in learning, goal setting and goal achievement ☐ transfers and applies learning in new situations; demonstrates commitment to lifelong learning ☐ thinks critically and acts logically to evaluate situations, solve problems and make decisions ☐ provides leadership in the effective use of learning strategies
Managing Resources <ul style="list-style-type: none"> ☐ adheres to established timelines; uses time/schedules/planners effectively ☐ uses information (material and human resources), as directed ☐ uses technology (facilities, equipment, supplies), as directed, to perform a task or provide a service ☐ maintains, stores and/or disposes of equipment and materials, as directed 	<ul style="list-style-type: none"> ☐ creates and adheres to timelines, with limited direction; uses time/schedules/planners effectively ☐ accesses and uses a range of relevant information (material and human resources), with limited direction ☐ uses technology (facilities, equipment, supplies), as appropriate, to perform a task or provide a service, with minimal assistance and supervision ☐ maintains, stores and/or disposes of equipment and materials, with limited assistance 	<ul style="list-style-type: none"> ☐ creates and adheres to detailed timelines on an independent basis; prioritizes task; uses time/schedules/planners effectively ☐ accesses a range of information (material and human resources), and recognizes when additional resources are required ☐ selects and uses appropriate technology (facilities, equipment, supplies) to perform a task or provide a service on an independent basis ☐ maintains, stores and/or disposes of equipment and materials on an independent basis 	<ul style="list-style-type: none"> ☐ creates and adheres to detailed timelines; uses time/schedules/planners effectively; prioritizes tasks on a consistent basis ☐ uses a wide range of information (material and human resources) in order to support and enhance the basic requirement ☐ recognizes the monetary and intrinsic value of managing technology (facilities, equipment, supplies) ☐ demonstrates effective techniques for managing facilities, equipment and supplies
Problem Solving and Innovation <ul style="list-style-type: none"> ☐ participates in problem solving as a process ☐ learns a range of problem-solving skills and approaches ☐ practices problem-solving skills by responding appropriately to a clearly defined problem, specified goals and constraints, by: <ul style="list-style-type: none"> – generating alternatives – evaluating alternatives – selecting appropriate alternative(s) – taking action 	<ul style="list-style-type: none"> ☐ identifies the problem and selects an appropriate problem-solving approach, responding appropriately to specified goals and constraints ☐ applies problem-solving skills to a directed or a self-directed activity, by: <ul style="list-style-type: none"> – generating alternatives – evaluating alternatives – selecting appropriate alternative(s) – taking action 	<ul style="list-style-type: none"> ☐ thinks critically and acts logically in the context of problem solving ☐ transfers problem-solving skills to real-life situations, by generating new possibilities ☐ prepares implementation plans ☐ recognizes risks 	<ul style="list-style-type: none"> ☐ identifies and resolves problems efficiently and effectively ☐ identifies and suggests new ideas to get the job done creatively, by: <ul style="list-style-type: none"> – combining ideas or information in new ways – making connections among seemingly unrelated ideas – seeking out opportunities in an active manner

Stage 1— <i>The student:</i>	Stage 2— <i>The student:</i>	Stage 3— <i>The student:</i>	Stage 4— <i>The student:</i>
Communicating Effectively <ul style="list-style-type: none"> ☐ uses communication skills; e.g., reading, writing, illustrating, speaking ☐ uses language in appropriate context ☐ listens to understand and learn ☐ demonstrates positive interpersonal skills in selected contexts 	<ul style="list-style-type: none"> ☐ communicates thoughts, feelings and ideas to justify or challenge a position, using written, oral and/or visual means ☐ uses technical language appropriately ☐ listens and responds to understand and learn ☐ demonstrates positive interpersonal skills in many contexts 	<ul style="list-style-type: none"> ☐ prepares and effectively presents accurate, concise, written, visual and/or oral reports providing reasoned arguments ☐ encourages, persuades, convinces or otherwise motivates individuals ☐ listens and responds to understand, learn and teach ☐ demonstrates positive interpersonal skills in most contexts 	<ul style="list-style-type: none"> ☐ negotiates effectively, by working toward an agreement that may involve exchanging specific resources or resolving divergent interests ☐ negotiates and works toward a consensus ☐ listens and responds to understand, learn, teach and evaluate ☐ promotes positive interpersonal skills among others
Working with Others <ul style="list-style-type: none"> ☐ fulfills responsibility in a group project ☐ works collaboratively in structured situations with peer members ☐ acknowledges the opinions and contributions of others in the group 	<ul style="list-style-type: none"> ☐ ☐ cooperates to achieve group results ☐ maintains a balance between speaking, listening and responding in group discussions ☐ respects the feelings and views of others 	<ul style="list-style-type: none"> ☐ seeks a team approach, as appropriate, based on group needs and benefits; e.g., idea potential, variety of strengths, sharing of workload ☐ works in a team or group: <ul style="list-style-type: none"> – encourages and supports team members – helps others in a positive manner – provides leadership/followership as required – negotiates and works toward consensus as required 	<ul style="list-style-type: none"> ☐ leads, where appropriate, mobilizing the group for high performance ☐ understands and works within the context of the group ☐ prepares, validates and implements plans that reveal new possibilities
Demonstrating Responsibility <p>Attendance</p> <ul style="list-style-type: none"> ☐ demonstrates responsibility in attendance, punctuality and task completion <p>Safety</p> <ul style="list-style-type: none"> ☐ follows personal and environmental health and safety procedures ☐ identifies immediate hazards and their impact on self, others and the environment ☐ follows appropriate/emergency response procedures <p>Ethics</p> <ul style="list-style-type: none"> ☐ makes personal judgements about whether or not certain behaviours/actions are right or wrong 	<ul style="list-style-type: none"> ☐ ☐ recognizes and follows personal and environmental health and safety procedures ☐ identifies immediate and potential hazards and their impact on self, others and the environment ☐ ☐ assesses how personal judgements affect other peer members and/or family; e.g., home and school 	<ul style="list-style-type: none"> ☐ ☐ establishes and follows personal and environmental health and safety procedures ☐ ☐ ☐ assesses the implications of personal/group actions within the broader community; e.g., workplace 	<ul style="list-style-type: none"> ☐ ☐ transfers and applies personal and environmental health and safety procedures to a variety of environments and situations ☐ ☐ ☐ demonstrates accountability for actions taken to address immediate and potential hazards ☐ analyzes the implications of personal/group actions within the global context ☐ states and defends a personal code of ethics as required
★ Developmental Framework <ul style="list-style-type: none"> • Simple task • Structured environment • Directed learning 	<ul style="list-style-type: none"> • Task with limited variables • Less structured environment • Limited direction 	<ul style="list-style-type: none"> • Task with multiple variables • Flexible environment • Self-directed learning, seeking assistance as required 	<ul style="list-style-type: none"> • Complex task • Open environment • Self-directed/self-motivated

GENERIC RATING SCALE

S C A L E	RUBRIC STATEMENT (included in assessment tool/statements in <i>italics</i> are optional)	IS TASK/ PROJECT COMPLETED?	PROBLEM SOLVING: STUDENT INITIATIVE VS TEACHER DIRECTION/ SUPPORT	USE OF TOOLS, MATERIALS, PROCESSES	STANDARDS OF QUALITY/ PRODUCTIVITY	TEAMWORK LEADERSHIP	SERVICE CLIENT/ CUSTOMER
4	<i>The student:</i> exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence. <i>Quality, particularly details and finishes, and productivity are consistent and exceed standards. Leads others to contribute team goals. Analyzes and provides effective client/customer services beyond expectations.</i>	Exceeds defined outcomes.	Plans and solves problems effectively and creatively in a self-directed manner.	Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.	Quality, particularly details and finishes, and productivity are consistent and exceed standards.	Leads others to contribute team goals.	Analyzes and provides effective client/customer services beyond expectations.
3	meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively. <i>Quality and productivity are consistent. Works cooperatively and contributes ideas and suggestions that enhance team effort. Analyzes and provides effective client/customer services.</i>	Meets defined outcomes.	Plans and solves problems in a self-directed manner.	Tools, materials and/or processes are selected and used efficiently and effectively.	Quality and productivity are consistent.	Works cooperatively and contributes ideas and suggestions that enhance team effort.	Analyzes and provides effective client/customer services.
2	meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately. <i>Quality and productivity are reasonably consistent. Works cooperatively to achieve team goals. Identifies and provides customer/client services.</i>	Meets defined outcomes.	Plans and solves problems with limited assistance.	Tools, materials and/or processes are selected and used appropriately.	Quality and productivity are reasonably consistent.	Works cooperatively to achieve team goals.	Identifies and provides customer/client services.
1	meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately. <i>Quality and productivity are reasonably consistent. Works cooperatively. Provides a limited range of customer/client services.</i>	Meets defined outcomes.	Follows a guided plan of action.	A limited range of tools, materials and/or processes are used appropriately.	Quality and productivity are reasonably consistent.	Works cooperatively.	Provides a limited range of customer/client services.
0	has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.	Has not completed defined outcomes.		Tools, materials and/or processes are used inappropriately.			

INTRODUCTORY	INTERMEDIATE	ADVANCED
<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • accurately describes an issue on which people disagree • poses an important question regarding the issue • accesses basic in-school/community information sources regarding the issue • uses one or more information-gathering techniques <p>Analyzing Perspectives</p> <ul style="list-style-type: none"> • clarifies different points of view regarding the issue; <i>e.g., social, economic, environmental</i> • states a position on the issue and logical reasons for adopting that position • states an opposing position on the issue and logical reasons for adopting that position • identifies sources of conflict among different positions • distinguishes between fact and fiction/opinion/theory <p>Collaboration and Teamwork</p> <ul style="list-style-type: none"> • shares work appropriately among group members • respects the views of others <p>Evaluating Choices/Making Decisions</p> <ul style="list-style-type: none"> • identifies useful alternatives regarding the issue • establishes criteria for assessing each alternative; <i>e.g., social, economic, environmental</i> • selects an appropriate alternative based on established criteria • reflects on strengths/weaknesses of decisions by considering consequences • communicates information in a logical sequence to justify choices/decisions made 	<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • accurately describes an issue on which people disagree, explaining areas of disagreement • poses one or more thoughtful questions regarding the issue • accesses a range of relevant in-school/community resources • uses a range of information-gathering techniques <p>Analyzing Perspectives</p> <ul style="list-style-type: none"> • categorizes different points of view regarding the issue; <i>e.g., cultural, ethical, economic, environmental, health-related</i> • states a position on the issue and logical reasons for adopting that position • states two or more opposing positions on the issue and logical reasons for adopting each position • describes interrelationships among different perspectives/points of view • determines accuracy/currency/reliability of information and ideas <p>Collaboration and Teamwork</p> <ul style="list-style-type: none"> • shares work appropriately among group members • respects and considers the views of others • negotiates solutions to problems <p>Evaluating Choices/Making Decisions</p> <ul style="list-style-type: none"> • identifies important and appropriate alternatives regarding the issue • establishes knowledge- and value-based criteria for assessing each alternative; <i>e.g., social, economic, environmental</i> • selects an appropriate alternative by showing differences among choices • assesses strengths/weaknesses of decisions by considering consequences • communicates ideas in a logical sequence with supporting detail to justify choices/decisions made 	<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • accurately describes an issue on which people disagree, explaining specific causes of disagreement • poses thoughtful questions regarding the issue • accesses a range of relevant information sources and recognizes when additional information is required • demonstrates resourcefulness in collecting data <p>Analyzing Perspectives</p> <ul style="list-style-type: none"> • categorizes different points of view regarding the issue; <i>e.g., cultural, ethical, economic, environmental, health-related, scientific, political</i> • states a position on the issue and insightful reasons for adopting that position • states three or more opposing positions on the issue and thoughtful reasons for adopting each position • analyzes interrelationships among different perspectives/points of view • recognizes underlying bias/assumptions/values in information and ideas <p>Collaboration and Teamwork</p> <ul style="list-style-type: none"> • shares work appropriately among group members • respects and considers the views of others • negotiates with sensitivity solutions to problems <p>Evaluating Choices/Making Decisions</p> <ul style="list-style-type: none"> • describes in detail important and appropriate alternatives regarding the issue • establishes knowledge- and value-based criteria for assessing each alternative; <i>e.g., social, economic, environmental</i> • selects an appropriate and useful alternative by showing differences among choices • assesses strengths/weaknesses of decisions by considering consequences and implications • communicates thoughts/feelings/ideas clearly to justify choices/decisions made

INTRODUCTORY	INTERMEDIATE	ADVANCED
<p><i>The student:</i></p> <p>Management</p> <ul style="list-style-type: none"> • prepares self for task • organizes and works in an orderly manner • carries out instructions accurately • uses time effectively <p>Teamwork</p> <ul style="list-style-type: none"> • cooperates with group members • shares work appropriately among group members <p>Equipment and Materials</p> <ul style="list-style-type: none"> • selects and uses appropriate equipment/materials • follows safe procedures/techniques • weighs and measures accurately • returns clean equipment/materials to storage areas <p>Investigative Techniques</p> <ul style="list-style-type: none"> • gathers and applies information from at least one source • makes predictions that can be tested • sets up and conducts experiments to test a prediction • distinguishes between manipulated/responding variables • obtains results that can be used to determine if some aspect of the prediction is accurate • summarizes important experimental outcomes 	<p><i>The student:</i></p> <p>Management</p> <ul style="list-style-type: none"> • prepares self for task • organizes and works in an orderly manner • interprets and carries out instructions accurately • plans and uses time effectively • adheres to routine procedures <p>Teamwork</p> <ul style="list-style-type: none"> • cooperates with group members • shares work appropriately among group members • negotiates solutions to problems <p>Equipment and Materials</p> <ul style="list-style-type: none"> • selects and uses appropriate equipment/materials • models safe procedures/techniques • weighs and measures accurately • practises proper sanitation procedures • minimizes waste of materials • advises of potential hazards and necessary repairs <p>Investigative Techniques</p> <ul style="list-style-type: none"> • gathers and applies information from a variety of sources • makes predictions that can be tested • plans, sets up and conducts experiments to test a prediction • identifies and explains manipulated/responding variables • obtains accurate results that confirm/reject the prediction • summarizes and applies experimental outcomes 	<p><i>The student:</i></p> <p>Management</p> <ul style="list-style-type: none"> • prepares self for task • organizes and works in an orderly manner • interprets and carries out instructions accurately • plans and uses time effectively in a logical sequence • displays leadership in adhering to routine procedures • attempts to solve problems prior to requesting help <p>Teamwork</p> <ul style="list-style-type: none"> • cooperates with group members • shares work appropriately among group members • negotiates with sensitivity solutions to problems • displays effective communication skills <p>Equipment and Materials</p> <ul style="list-style-type: none"> • selects and uses equipment/materials independently • demonstrates concern for safe procedures/techniques • weighs and measures accurately and efficiently • practises proper sanitation procedures • minimizes waste of materials • anticipates potential hazards and emergency response <p>Investigative Techniques</p> <ul style="list-style-type: none"> • uses relevant information to explain observations • makes predictions that can be tested • plans, sets up and conducts experiments to test a prediction • analyzes relationships among manipulated/responding variables • obtains accurate results that confirm/reject prediction and answer related questions • summarizes, applies and evaluates experimental outcomes

INTRODUCTORY	INTERMEDIATE	ADVANCED
<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • accurately describes an issue on which people disagree • poses an important question regarding the issue • accesses basic in-school/community information sources regarding the issue • uses one or more information-gathering techniques <p>Analyzing Perspectives</p> <ul style="list-style-type: none"> • states a position on the issue and logical reasons for adopting that position • explains why the issue is important by presenting examples of possible consequences • clarifies different points of view regarding the issue; <i>e.g., social, economic, environmental</i> • distinguishes between fact and fiction/opinion/theory <p>Collaboration and Teamwork</p> <ul style="list-style-type: none"> • works with a range of peer members • shares information/opinions/suggestions through group discussion • listens to and respects the views of others <p>Negotiating and Debating</p> <ul style="list-style-type: none"> • presents a convincing argument in logical sequence supporting a position adopted on the issue • provides a relevant response to opposing arguments • speaks clearly so the argument can be understood • establishes a shared understanding of key alternatives and consequences relevant to the issue 	<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • accurately describes an issue on which people disagree, explaining areas of disagreement • poses one or more thoughtful questions regarding the issue • accesses a range of relevant in-school/community resources • uses a range of information-gathering techniques <p>Analyzing Perspectives</p> <ul style="list-style-type: none"> • states a position on the issue and logical reasons for adopting that position • explains why the issue is important by presenting examples of possible consequences • categorizes different points of view regarding the issue; <i>e.g., cultural, ethical, economic, environmental, health-related</i> • determines accuracy/currency/reliability of information and ideas <p>Collaboration and Teamwork</p> <ul style="list-style-type: none"> • works with a range of peer members • shares information/opinions/suggestions, maintaining a balance between speaking and listening • listens to and respects the views of others, requesting clarification as necessary from other group members <p>Negotiating and Debating</p> <ul style="list-style-type: none"> • presents a convincing argument in logical sequence supporting a position adopted, conveying points in order of importance • provides a relevant and convincing response to opposing arguments • speaks clearly without hesitation so the argument can be understood • negotiates a shared agreement on preferred alternatives relevant to the issue 	<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • accurately describes an issue on which people disagree, explaining specific causes of disagreement • poses thoughtful questions regarding the issue • accesses a range of relevant information sources and recognizes when additional information is required • demonstrates resourcefulness in collecting data <p>Analyzing Perspectives</p> <ul style="list-style-type: none"> • states a position on the issue and insightful reasons for adopting that position • explains why the issue is important by presenting examples of possible consequences and implications • categorizes different points of view regarding the issue; <i>e.g., cultural, ethical, economic, environmental, health-related, scientific, political</i> • recognizes underlying bias/assumptions/values in information and ideas <p>Collaboration and Teamwork</p> <ul style="list-style-type: none"> • works with a wide range of peer members • shares information/opinions/suggestions, maintaining a balance between speaking and listening • listens to and respects the views of others, requesting clarification as necessary from other group members <p>Negotiating and Debating</p> <ul style="list-style-type: none"> • presents a convincing argument in logical sequence supporting a position adopted, conveying points in order of importance and backing each with sound evidence • provides a relevant and convincing rebuttal to opposing arguments • speaks clearly without hesitation so the argument can be understood by all listeners • negotiates a shared agreement on preferred alternatives by resolving divergent points of view

INTRODUCTORY	INTERMEDIATE	ADVANCED
<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • sets goals and follows instructions accurately • responds to directed questions and follows necessary steps to find answers • accesses basic in-school/community information sources • interprets and organizes information into a logical sequence • records information accurately, using correct technical terms • uses time effectively <p>Presentation</p> <ul style="list-style-type: none"> • demonstrates effective use of at least one medium of communication: <i>e.g., <u>Written:</u> spelling, punctuation, grammar, basic format</i> <i>Oral:</i> voice projection, body language <i>Audio-Visual:</i> techniques, tools <ul style="list-style-type: none"> • uses correct grammatical convention and technical terms through proofreading/editing • provides an introduction that describes the purpose of the project • communicates information in a logical sequence • states a conclusion based on a summary of facts • provides a reference list of three or more basic information sources 	<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • sets goals and describes steps to achieve them • uses personal initiative to formulate questions and find answers • accesses a range of relevant in-school/community resources • interprets, organizes and combines information into a logical sequence • records information accurately with appropriate supporting detail and using correct technical terms • plans and uses time effectively • gathers and responds to feedback regarding approach to task and project status <p>Presentation</p> <ul style="list-style-type: none"> • demonstrates effective use of at least two communication media: <i>e.g., <u>Written:</u> spelling, punctuation, grammar, format (formal/informal)</i> <i>Oral:</i> voice projection, body language, appearance <i>Audio-Visual:</i> techniques, tools, clarity <ul style="list-style-type: none"> • maintains acceptable grammatical and technical standards through proofreading and editing • provides an introduction that describes the purpose and scope of the project • communicates ideas into a logical sequence with sufficient supporting detail • states a conclusion by synthesizing the information gathered • provides a reference list that includes five or more relevant information sources 	<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • sets goals and describes steps to achieve them • uses personal initiative to formulate questions and find answers • accesses a range of relevant information sources and recognizes when additional information is required • interprets, organizes and combines information in creative and thoughtful ways • records information accurately, using appropriate technical terms and supporting detail • plans and uses time effectively, prioritizing tasks on a consistent basis • assesses and refines approach to task and project status based on feedback and reflection <p>Presentation</p> <ul style="list-style-type: none"> • demonstrates effective use of a variety of communication media: <i>e.g., <u>Written:</u> spelling, punctuation, grammar, format (formal/informal, technical/literary)</i> <i>Oral:</i> voice projection, body language, appearance, enthusiasm, evidence of prior practice <i>Audio-Visual:</i> techniques, tools, clarity, speed and pacing <ul style="list-style-type: none"> • maintains acceptable grammatical and technical standards through proofreading and editing • provides an introduction that describes the purpose and scope of the project • communicates thoughts/feelings/ideas clearly to justify or challenge a position • states a conclusion by analyzing and synthesizing the information gathered • gives evidence of adequate research through a reference list including seven or more relevant information sources

INTRODUCTORY	INTERMEDIATE	ADVANCED
<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • sets goals and follows instructions accurately • adheres to established timelines • responds to directed questions and follows necessary steps to find answers • uses time effectively <p>Information Gathering and Processing</p> <ul style="list-style-type: none"> • accesses basic in-school/community information sources • uses one or more information-gathering techniques • interprets and organizes information in a logical sequence • records information accurately, using correct technical terms • distinguishes between fact and fiction/opinion/theory • responds to feedback when current approach is not working <p>Collaboration and Teamwork</p> <ul style="list-style-type: none"> • cooperates with group members • shares work appropriately among group members <p>Information Sharing</p> <ul style="list-style-type: none"> • demonstrates effective use of one or more communication media; <i>e.g., written, oral, audio-visual</i> • communicates information in a logical sequence • uses correct grammatical convention and technical terms • cites three or more basic information sources 	<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • sets goals and establishes steps to achieve them • creates and adheres to useful timelines • uses personal initiative to formulate questions and find answers • plans and uses time effectively <p>Information Gathering and Processing</p> <ul style="list-style-type: none"> • accesses a range of relevant in-school/community resources • uses a range of information-gathering techniques • interprets, organizes and combines information into a logical sequence • records information accurately with appropriate supporting detail and using correct technical terms • determines accuracy/currency/reliability of information sources • gathers and responds to feedback regarding approach to the task <p>Collaboration and Teamwork</p> <ul style="list-style-type: none"> • cooperates with group members • shares work appropriately among group members • negotiates solutions to problems <p>Information Sharing</p> <ul style="list-style-type: none"> • demonstrates effective use of two or more communication media; <i>e.g., written, oral, audio-visual</i> • communicates ideas in a logical sequence with sufficient supporting detail • maintains acceptable grammatical and technical standards • cites five or more relevant information sources 	<p><i>The student:</i></p> <p>Preparation and Planning</p> <ul style="list-style-type: none"> • sets clear goals and establishes steps to achieve them • creates and adheres to detailed timelines • uses personal initiative to formulate questions and find answers • plans and uses time effectively, prioritizing tasks on a consistent basis <p>Information Gathering and Processing</p> <ul style="list-style-type: none"> • accesses a range of relevant information sources and recognizes when additional information is required • demonstrates resourcefulness in collecting data • interprets, organizes and combines information in creative and thoughtful ways • records information accurately with appropriate supporting detail and using correct technical terms • recognizes underlying bias/assumptions/values in information sources • assesses and refines approach to the task and project status based on feedback and reflection <p>Collaboration and Teamwork</p> <ul style="list-style-type: none"> • cooperates with group members • shares work appropriately among group members • negotiates with sensitivity solutions to problems • displays effective communication and leadership skills <p>Information Sharing</p> <ul style="list-style-type: none"> • demonstrates effective use of a variety of communication media; <i>e.g., written, oral, audio-visual</i> • communicates thoughts/feelings/ideas clearly to justify or challenge a position • maintains acceptable grammatical and technical standards • gives evidence of adequate information gathering by citing seven or more relevant information sources

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Content	4	3	2	1	0
Presenting/Reporting	4	3	2	1	0
					N/A

STANDARD IS 1 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST*The student:***Preparation and Planning**

- ☐ sets goals and follows instruction accurately
- ☐ responds to directed questions and follows necessary steps to find answers
- ☐ accesses basic in-school/community information sources
- ☐ interprets and organizes information into a logical sequence
- ☐ records information accurately, using correct technical terms
- ☐ uses time effectively

Content**Presenting/Reporting**

- ☐ demonstrates effective use of at least one medium of communication:
e.g., Written: spelling, punctuation, grammar, basic format
Oral: voice projection, body language

Audio-Visual: techniques, tools

- ☐ uses correct grammatical convention and technical terms through proofreading/editing
- ☐ provides an introduction that describes the purpose of the project
- ☐ communicates information in a logical sequence
- ☐ states a conclusion based on a summary of facts
- ☐ provides a reference list of three or more basic information sources

Content (continued)**REFLECTIONS/COMMENTS:**

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Content	4	3	2	1	0
Presenting/Reporting	4	3	2	1	0
					N/A

STANDARD IS 2 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST*The student:***Preparation and Planning**

- ☐ sets goals and describes steps to achieve them
- ☐ uses personal initiative to formulate questions and find answers
- ☐ accesses a range of relevant in-school/community resources
- ☐ interprets, organizes and combines information into a logical sequence
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ plans and uses time effectively
- ☐ gathers and responds to feedback regarding approach to task and project status

Content**Content (continued)****Presenting/Reporting**

- ☐ demonstrates effective use of at least two communication media:
e.g., Written: spelling, punctuation, grammar, format (formal/informal)
Oral: voice projection, body language, appearance
Audio-Visual: techniques, tools, clarity
- ☐ maintains acceptable grammatical and technical standards through proofreading and editing
- ☐ provides an introduction that describes the purpose and scope of the project
- ☐ communicates ideas into a logical sequence with sufficient supporting detail
- ☐ states a conclusion by synthesizing the information gathered
- ☐ provides a reference list that includes five or more relevant information sources

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Content	4	3	2	1	0
Presenting/Reporting	4	3	2	1	0
					N/A

STANDARD IS 3 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

G.20/ Forestry, CTS
(1997)

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and describes steps to achieve them
- ☐ uses personal initiative to formulate questions and find answers
- ☐ accesses a range of relevant information sources and recognizes when additional information is required
- ☐ interprets, organizes and combines information in creative and thoughtful ways
- ☐ records information accurately, using appropriate technical terms and supporting detail
- ☐ plans and uses time effectively, prioritizing tasks on a consistent basis
- ☐ accesses and refines approach to task and project status based on feedback and reflection

Content

Content (continued)

Presenting/Reporting

- ☐ demonstrates effective use of at least one medium of communication:
e.g., Written: spelling, punctuation, grammar, format (formal/informal, technical/literary)
Oral: voice projection, body language, appearance, enthusiasm, evidence of prior practice
Audio-Visual: techniques, tools, clarity, speed and pacing
- ☐ maintains acceptable grammatical and technical standards through proofreading and editing
- ☐ provides an introduction that describes the purpose and scope of the project
- ☐ communicates thoughts/feelings/ideas clearly to justify or challenge a position
- ☐ states a conclusion by analyzing and synthesizing the information gathered
- ☐ gives evidence of adequate research through a reference list including seven or more relevant information sources

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING			
Preparation and Planning	4	3	2	1 0 N/A
Information Gathering and Processing	4	3	2	1 0 N/A
Content	4	3	2	1 0 N/A
Collaboration and Teamwork	4	3	2	1 0 N/A
Information Sharing	4	3	2	1 0 N/A

STANDARD IS 1 IN EACH APPLICABLE TASK**Rating Scale**

The student:

4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.

3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.

2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.

1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.

0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

Assessment Tools

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TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and follows instructions accurately
- ☐ adheres to established timelines
- ☐ responds to directed questions and follows necessary steps to find answers
- ☐ uses time effectively

Information Gathering and Processing

- ☐ accesses basic in-school/community information sources
- ☐ uses one or more information-gathering techniques
- ☐ interprets and organizes information into a logical sequence
- ☐ records information accurately, using correct technical terms
- ☐ distinguishes between fact and fiction/opinion/theory
- ☐ responds to feedback when current approach is not working

Content

- ☐ describes one or more career opportunities within the field; e.g.:
 - labour-based
 - technical
 - professional

Content (continued)

- ☐ identifies and describes occupations relevant to one or more career opportunities; e.g.:
 - nature of the occupation
 - duties of the employee
- ☐ provides a survey of current employment statistics relevant to one or more careers; e.g.:
 - types of occupations
 - number of employees
- ☐ identifies entrance requirements and training programs relevant to one or more careers; e.g.:
 - entrance requirements and competencies
 - type of training programs
- ☐ assesses current and future employment opportunities and trends; e.g.:
 - local and national needs
 - opportunities for advancement

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members

Information Sharing

- ☐ demonstrates effective use of one or more communication media:
 - e.g., written, oral, audio-visual*
- ☐ communicates information in a logical sequence
- ☐ uses correct grammatical conventions and technical terms
- ☐ cites three or more basic information sources

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Information Gathering and Processing	4	3	2	1	0
Content	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Information Sharing	4	3	2	1	0

STANDARD IS 2 IN EACH APPLICABLE TASK**Rating Scale**

The student:

4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.

3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.

2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.

1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.

0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

G.22/ Forestry, CTS

(1997)

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and establishes steps to achieve them
- ☐ creates and adheres to useful timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively

Information Gathering and Processing

- ☐ accesses a range of relevant in-school/community resources
- ☐ uses a range of information-gathering techniques
- ☐ interprets, organizes and combines information into a logical sequence
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ determines accuracy/currency/reliability of information sources
- ☐ gathers and responds to feedback regarding approach to the task

Content

- ☐ describes one or more career opportunities within the field; e.g.:
 - labour-based
 - technical
 - professional
- ☐ identifies and describes occupations relevant to one or more career opportunities; e.g.:
 - nature of the occupation
 - duties of the employee
 - workplace conditions

Content (continued)

- ☐ provides a survey of current employment statistics relevant to one or more careers; e.g.:
 - types of occupations
 - number of employees
 - employment trends
- ☐ identifies entrance requirements and training programs relevant to one or more careers; e.g.:
 - entrance requirements and competencies
 - type and extent of training programs
- ☐ assesses current and future employment opportunities and trends; e.g.:
 - local, national and international needs
 - opportunities for advancement and/or career change

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates solutions to problems

Information Sharing

- ☐ demonstrates effective use of two or more communication media:
 - e.g., written, oral, audio-visual*
- ☐ communicates ideas in a logical sequence with sufficient supporting detail
- ☐ maintains acceptable grammatical and technical standards
- ☐ cites five or more relevant information sources

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING			
Preparation and Planning	4	3	2	1 0 N/A
Information Gathering and Processing	4	3	2	1 0 N/A
Content	4	3	2	1 0 N/A
Collaboration and Teamwork	4	3	2	1 0 N/A
Information Sharing	4	3	2	1 0 N/A

STANDARD IS 3 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

Assessment Tools

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TASK CHECKLIST*The student:***Preparation and Planning**

- ☐ sets clear goals and establishes steps to achieve them
- ☐ creates and adheres to detailed timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively, prioritizing tasks on a consistent basis

Information Gathering and Processing

- ☐ accesses a range of relevant information sources and recognizes when additional information is required
- ☐ demonstrates resourcefulness in collecting data
- ☐ interprets, organizes and combines information in creative and thoughtful ways
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ recognizes underlying bias/assumptions/values in information sources
- ☐ assesses and refines approach to the task and project status based on feedback and reflection

Content

- ☐ describes one or more career opportunities within the field; e.g.:
 - labour-based
 - technical
 - professional
- ☐ identifies and describes occupations relevant to one or more career opportunities; e.g.:
 - nature of the occupation
 - duties of the employee
 - workplace conditions
 - salary/wages and employee benefits

Content (continued)

- ☐ provides a survey of current employment statistics relevant to one or more careers; e.g.:
 - types of occupations
 - number of employees
 - employment trends
- ☐ identifies entrance requirements and training programs relevant to one or more careers; e.g.:
 - entrance requirements and competencies
 - type and extent of training programs
 - post-secondary institutions
- ☐ assesses current and future employment opportunities and trends; e.g.:
 - local, national and international needs
 - opportunities for advancement and/or career change
 - opportunities for self-employment and entrepreneurship

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates with sensitivity solutions to problems
- ☐ displays effective communication and leadership skills

Information Sharing

- ☐ demonstrates effective use of a variety of communication media:
 - e.g., written, oral, audio-visual
- ☐ communicates thoughts/feelings/ideas clearly to justify or challenge a position
- ☐ maintains acceptable grammatical and technical standards
- ☐ gives evidence of adequate information gathering by citing seven or more relevant information sources

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Analyzing Perspectives	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Negotiating and Debating	4	3	2	1	0

STANDARD IS 1 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4
 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 3
 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2
 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1
 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0
 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST
 The student:

Preparation and Planning
☐ accurately describes an issue on which people disagree
 ☐ poses an important question regarding the issue
 ☐ accesses basic in-school/community information sources regarding the issue
 ☐ uses one or more information-gathering techniques

Collaboration and Teamwork
☐ works with a range of peer members
 ☐ shares information/opinions/suggestions through group discussion
 ☐ listens to and respects the views of others

Negotiating and Debating
☐ presents a convincing argument in logical sequence supporting a position adopted on the issue
 ☐ provides a relevant response to opposing arguments
 ☐ speaks clearly so the argument can be understood
 ☐ establishes a shared understanding of key alternatives and consequences relevant to the issue

Analyzing Perspectives
☐ states a position on the issue and logical reasons for adopting that position
 ☐ explains why the issue is important by presenting examples of possible consequences
 ☐ clarifies different points of view regarding the issue; *e.g., social, economic, environmental*
☐ distinguishes between fact and fiction/opinion/theory

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Analyzing Perspectives	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Negotiating and Debating	4	3	2	1	0

STANDARD IS 2 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

Assessment Tools

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CTS, Forestry /G.25
(1997)**TASK CHECKLIST***The student:***Preparation and Planning**

- ☐ accurately describes an issue on which people disagree, explaining areas of disagreement
- ☐ poses one or more thoughtful questions regarding the issue
- ☐ assesses a range of relevant in-school/community resources
- ☐ uses a range of information-gathering techniques

Collaboration and Teamwork

- ☐ works with a range of peer members
- ☐ shares information/opinions/suggestions, maintaining a balance between speaking and listening
- ☐ listens to and respects the views of others, requesting clarification as necessary from other group members

Analyzing Perspectives

- ☐ states a position on the issue and logical reasons for adopting that position
- ☐ explains why the issue is important by presenting examples of possible consequences
- ☐ categorizes different points of view regarding the issue; *e.g., cultural, ethical, economic, environmental, health-related*
- ☐ determines accuracy/currency/reliability of information and ideas

Negotiating and Debating

- ☐ presents a convincing argument in logical sequence supporting a position adopted, conveying points in order of importance
- ☐ provides a relevant and convincing response to opposing arguments
- ☐ speaks clearly without hesitation so the argument can be understood
- ☐ negotiates a shared agreement on preferred alternatives relevant to the issue

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Analyzing Perspectives	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Negotiating and Debating	4	3	2	1	0

STANDARD IS 3 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ accurately describes an issue on which people disagree, explaining specific causes of disagreement
- ☐ poses thoughtful questions regarding the issue
- ☐ accesses a range of relevant information sources and recognizes when additional information is required
- ☐ demonstrates resourcefulness in collecting data

Collaboration and Teamwork

- ☐ works with a wide range of peer members
- ☐ shares information/opinions/suggestions, maintaining a balance between speaking and listening
- ☐ listens to and respects the views of others, requesting clarification as necessary from other group members

Negotiating and Debating

- ☐ presents a convincing argument in logical sequence supporting a position adopted, conveying points in order of importance and backing each with sound evidence
- ☐ provides a relevant and convincing rebuttal to opposing arguments
- ☐ speaks clearly without hesitation so the argument can be understood by all listeners
- ☐ negotiates a shared agreement on preferred alternatives by resolving divergent points of view

Analyzing Perspectives

- ☐ states a position on the issue and insightful reasons for adopting that position
- ☐ explains why the issue is important by presenting examples of possible consequences and implications
- ☐ categorizes different points of view regarding the issue; *e.g., cultural, ethical, economic, environmental, health-related, scientific, political*
- ☐ recognizes underlying bias/assumptions/values in information and ideas

REFLECTIONS/COMMENTS:

Student Name: _____

Course(s): _____ WLD1030 FOR1050 FOR1060 WLD2030 FOR2060 FOR3110

ACTIVITY/ TASK:							
DATE:							
Management	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0
Teamwork	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0
Equipment and Materials	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0
Environmental Ethics	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0

Rating Scale*The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.
- N/A Not Applicable

ASSESSMENT CRITERIA*The student:***Management**

- ☐ prepares self for task
- ☐ organizes and works in an orderly manner
- ☐ interprets and carries out instructions accurately
- ☐ plans and uses time in a logical sequence
- ☐ attempts to solve problems prior to requesting help
- ☐ _____
- ☐ _____

Teamwork

- ☐ cooperates with group members
- ☐ shares tasks/tools appropriately among peers
- ☐ negotiates solutions to problems
- ☐ displays effective communication skills
- ☐ _____
- ☐ _____

Equipment and Materials

- ☐ selects appropriate equipment and materials
- ☐ handle/uses equipment and materials safely
- ☐ demonstrates concern for safe procedures/techniques
- ☐ cleans/maintains/stores equipment in a safe manner
- ☐ keeps work/study environment clean and organized
- ☐ advises of immediate hazards and necessary repairs
- ☐ _____
- ☐ _____

Environmental Ethics

- ☐ protects flora and fauna
- ☐ chooses environmentally friendly materials
- ☐ minimizes generation of waste materials
- ☐ follows accepted practices for disposing of wastes
- ☐ protects/manages water supply
- ☐ _____
- ☐ _____

ASSESSMENT CRITERIA: Letters of Support or Concern

FORLET

RATING	ASSESSMENT CRITERIA
	<p><i>The student:</i></p> <p>Preparation and Planning</p> <p>☐ identifies a specific issue regarding the forest environment</p> <p>☐ talks to others in order to clarify ideas</p> <p>☐ accesses basic in-school/community resources regarding the issue</p> <p>☐ identifies appropriate individuals/agencies to contact</p> <p>☐ establishes a position on the issue</p> <p>☐</p> <p>Writing the Letter</p> <p>☐ clearly states a position on the issue and a rationale for adopting that position</p> <p>☐ considers the implications of various approaches for dealing with the issue</p> <p>☐ cites references to support information/views</p> <p>☐ maintains an appropriate tone of communication</p> <p>☐ requests a response to the letter</p> <p>☐ uses correct grammatical and technical conventions</p> <p>☐ demonstrates proofreading and editing skills</p> <p>☐</p> <p>Critiquing the Response</p> <p>☐ identifies important elements of the response:</p> <p>– acknowledgement of support or concern</p> <p>– statement of position and rationale</p> <p>– reference to supporting information/views</p> <p>– comments regarding future options/alternatives</p> <p>☐ assesses quality of the response based on:</p> <p>– logical development of ideas</p> <p>– quality/quantity of supporting information and views</p> <p>– tone of communication</p> <p>☐ suggests possible improvements to the response and original letter</p> <p>☐</p>

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

REFLECTIONS/COMMENTS

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Technical Components	4	3	2	1	0
Information Sharing	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0

STANDARD IS 1 FOR INTRODUCTORY LEVEL MODULES, 2 FOR INTERMEDIATE LEVEL MODULES, AND 3 FOR ADVANCED LEVEL MODULES

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and follows instructions
- ☐ responds to directed questions and/or follows necessary steps to find answers
- ☐ uses time effectively
- ☐ accesses basic in-school/community information sources
- ☐ interprets and organizes information logically
- ☐ transfers and/or extrapolates data from print and visual sources to create maps
- ☐

Technical Components (continued)

- ☐ demonstrates appropriate use of colour, shading and/or patterns
- ☐ produces a document free of wrinkles and smudges
- ☐ maintains appropriate technical standards through proofreading and editing: e.g.:
 - spelling
 - legibility
- ☐

Information Sharing

- ☐ communicates map content through oral presentation
- ☐ demonstrates ability to use map overlays in presentation
- ☐ poses questions based on information provided in map
- ☐

Technical Components

- ☐ prepares an outline of the mapped area to scale
- ☐ provides an appropriate map title
- ☐ records relevant location data
- ☐ provides a map legend that explains:
 - map symbols
 - map scale
- ☐ organizes use of space; e.g.:
 - map size in relationship to paper size
 - use of borders
 - position of legend

Collaboration and Teamwork

- ☐ shares work appropriately among group members
- ☐ respects the views of others
- ☐ negotiates solutions to problems
- ☐

REFLECTIONS/COMMENTS

Student Name:	Date:
Media Source:	
Method of Presentation:	
Issue/Topic:	

GOALS/OBJECTIVES OF THE MEDIA PRESENTATION

SUMMARY OF INFORMATION PRESENTED (e.g., topic/issue, position taken, supporting detail, implications/consequences)

QUALITY/OBJECTIVITY OF INFORMATION PRESENTED (e.g., bias-balance, currency/reliability, logic/reasoning)

PERSONAL IMPACT OF MEDIA PRESENTATION

ASSESSING QUALITY/OBJECTIVITY	
Yes	No
☐	☐
<i>The media presentation:</i>	
☐	☐
clearly describes a topic/issue/position taken with sufficient supporting detail	
☐	☐
demonstrates bias-balance in the manner of presentation	
☐	☐
makes reference to different points of view (e.g., social, economic, environmental)	
☐	☐
distinguishes between fact and fiction/opinion/theory	
☐	☐
references current and reliable sources for information and ideas	
☐	☐
draws valid conclusions based on analysis/synthesis of information	
☐	☐

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

LOG/VERIFICATION OF VOLUNTEER WORK**FORLOG-VOL(a)**

Student Name: _____ Module: _____ Supervisor: _____

<p>Volunteer Service Provided: _____ Date: _____</p> <p>Volunteer Site/Location: _____</p> <p>Time Volunteered: _____</p> <p>Description of Volunteer Service:</p> <p>(a) goals/tasks established by supervisor _____</p> <p>_____</p> <p>_____</p> <p>(b) tasks completed by volunteer: _____</p> <p>_____</p> <p>_____</p> <p>Observations/Insights Gained From Volunteer Work:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Comments: _____</p> <p>_____</p> <p>_____</p> <p>(Student's Signature) _____</p> <p>(Supervisor's Signature) _____ (Supervisor's Phone Number) _____</p>	<p>Volunteer Service Provided: _____ Date: _____</p> <p>Volunteer Site/Location: _____</p> <p>Time Volunteered: _____</p> <p>Description of Volunteer Service:</p> <p>(a) goals/tasks established by supervisor _____</p> <p>_____</p> <p>_____</p> <p>(b) tasks completed by volunteer: _____</p> <p>_____</p> <p>_____</p> <p>Observations/Insights Gained From Volunteer Work:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Comments: _____</p> <p>_____</p> <p>_____</p> <p>(Student's Signature) _____</p> <p>(Supervisor's Signature) _____ (Supervisor's Phone Number) _____</p>
--	--

STANDARD: The student completes all sections of the log/verification for five hours of volunteer work.

PREPARATION AND PLANNING	YES	NO	N/A
<i>The student:</i>			
• identifies personal and environmental goals for volunteer work	☐	☐	
• prepares a list of potential environmental, forest industry and/or professional organizations to contact regarding volunteer work	☐	☐	☐
• contacts an organization regarding desire to volunteer, sharing personal information through interview and/or resume	☐	☐	☐
• obtains satisfactory placement for volunteer work	☐	☐	
• establishes a schedule of dates and times for volunteer work	☐	☐	
• identifies and adheres to school policies/procedures regarding off-campus activities	☐	☐	

STANDARD IS 2 IN EACH APPLICABLE TASK AREA

Rating Scale

The student:

4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.

3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.

2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.

1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.

0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

REFLECTIONS / COMMENTS

VERIFYING AND REFLECTING	YES	NO	N/A
<i>The student:</i>			
• submits a log of tasks undertaken for each volunteer site and/or work experience (see Part II)	☐	☐	
• performs volunteer tasks in a satisfactory manner (see Part II)	☐	☐	
• provides a brief written summary of personal observations/impressions regarding the volunteer experience: <ul style="list-style-type: none"> – contribution of tasks undertaken to environmental stewardship – problems encountered and suggested solutions – recommendations regarding future volunteer experiences 	☐	☐	

STUDENT LOG OF ACTIVITIES	VERIFICATION BY SUPERVISOR
<p>Student's Name: _____</p> <p>Sponsoring Organization: _____</p> <p>Supervisor's Name/Position: _____</p> <p>Date(s) of Volunteer Work: _____</p> <p>Time(s)/Duration of Volunteer Work: _____</p> <p>Volunteer Tasks Undertaken: _____</p>	<p><i>The student:</i></p> <p>☐ follows instructions and adheres to guidelines</p> <p>☐ uses time effectively</p> <p>☐ demonstrates concern for safe procedures and techniques</p> <p>☐ anticipates and advises of potential hazards</p> <p>☐ works cooperatively with other group members.</p> <p>Supervisor's Comments:</p>
<p>Student's Signature _____ Date _____</p>	<p>Supervisor's Signature _____ Date _____</p>

JOURNAL ENTRY:	#1	#2	#3	#4	#5
DATE:					
Individual/Group Preparedness	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A
Cooperation and Teamwork	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A
Responsibility and Safety	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A
Environmental Ethics	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A
TOTAL:					

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

CRITERIA FOR REFLECTION

The student:

Individual/Group Preparedness

- ☐ sets goals and follows instructions accurately
- ☐ adheres to established timelines
- ☐ identifies/assembles outdoor gear appropriate to the task
- ☐ uses time effectively

Cooperation and Teamwork

- ☐ works with a range of peer members
- ☐ shares work appropriately among group members
- ☐ considers the ideas/suggestions of others

Responsibility and Safety

- ☐ selects and uses appropriate equipment/materials
- ☐ follows safe procedures/techniques
- ☐ anticipates and advises of potential hazards
- ☐ practises proper sanitation procedures

Environmental Ethics

- ☐ uses environmentally friendly materials
- ☐ picks up garbage and carries everything out that is carried in
- ☐ avoids ecologically sensitive areas
- ☐ demonstrates techniques for protecting water supply

JOURNAL ENTRY:	#1	#2	#3	#4	#5
DATE:					
Preparation and Planning	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A
Comprehension and Analysis	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A
Evaluation and Decision-Making	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A
Presenting and Reporting	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A	4 3 2 1 0 N/A
TOTAL:					

REFLECTION CRITERIA*The student:***Preparation and Planning**

- ☐ sets goals and follow instructions accurately
- ☐ establishes a schedule of activities for completing each journal entry
- ☐ accesses in-school/community sources of information
- ☐ plans and uses time effectively

Comprehension and Analysis

- ☐ considers the impact of one or more personal attitudes, actions and/or lifestyles on the forest environment
- ☐ identifies relevant social, economic and/or environmental perspectives
- ☐ explains potential sources of conflict regarding personal attitudes, actions and/or lifestyle
e.g., Who? What? Where? Why?

Evaluation and Decision Making

- ☐ balances information and values
- ☐ demonstrates respect for and consider the views of others
- ☐ considers alternatives for environmental citizenship on the basis of their consequences and implications for the forest environment
- ☐ reflects on strengths of personal actions and lifestyle within the context of environmental responsibility, and suggest areas that need improvement

Presenting and Reporting

- ☐ uses correct grammatical convention and technical terms through proofreading/editing
- ☐ communicates information and ideas clearly in a logical sequence
- ☐ provides an introduction that describes the purpose of the journal entry
- ☐ states a conclusion based on a summary of information and ideas

Rating Scale*The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and with confidence.
 - 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
 - 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
 - 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
 - 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.
- N/A Not Applicable

PROPOSAL	RATIONALE	INTENDED OUTCOMES
1. Personal Action		
2. Leadership Role		

RATING SCALE

- 4 Demonstrates a thorough understanding of the need for action. Problems are solved independently in effective and creative ways. The rationale and outcomes are based on analysis of data and supported with sufficient detail.
- 3 Demonstrates an understanding of the need for action. Issues are effectively addressed in a self-directed manner. The rationale and outcomes are based on analysis of data and supported with some detail.
- 2 Demonstrates a general understanding of the need for action. Issues are addressed with guidance. The rationale and outcomes are based on limited data and detail.
- 1 Demonstrates partial understanding of the need for action. Attempts a proposal but the rationale and/or outcomes are general or unsupported.
- 0 Fails to understand the need for action or does not attempt a proposal.

DIRECTIONS

THE STUDENT PROVIDES TWO PROPOSALS FOR ENVIRONMENTAL ACTION - ONE BASED ON PERSONAL/INDIVIDUAL ACTION, THE OTHER INVOLVING A LEADERSHIP ROLE. EACH PROPOSAL TO BE SUPPORTED WITH A RATIONALE AND INTENDED OUTCOMES.

STANDARD

EACH PROPOSAL TO BE COMPLETED TO A STANDARD OF 1 IN INTRODUCTORY MODULES, 2 IN INTERMEDIATE MODULES, AND 3 IN ADVANCED MODULES.

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Technical Components	4	3	2	1	0
Information Sharing	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0

STANDARD IS 1 FOR INTRODUCTORY LEVEL MODULES, 2 FOR INTERMEDIATE LEVEL MODULES, AND 3 FOR ADVANCED LEVEL MODULES

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

Assessment Tools

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CTS, Forestry /G.37
(1997)

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and follows instructions
- ☐ responds to directed questions and/or follows necessary steps to find answers
- ☐ uses time effectively
- ☐ accesses basic in-school/community information sources
- ☐ interprets and organizes information logically
- ☐ transfers and/or extrapolates data from print and visual sources to create a diagram/technical drawing

Technical Components

- ☐ selects and uses appropriate drawing instruments and tools
- ☐ prepares an accurate outline of the theme to scale
- ☐ adds detail to the theme as required to ensure recognition and realism
- ☐ organizes use of space; e.g.:
 - diagram/technical drawing in relation to paper size
 - use of borders
 - position of labels

Technical Components (continued)

- ☐ accurately labels diagram/technical drawing components
- ☐ provides an appropriate title for the diagram/technical drawing
- ☐ demonstrates appropriate use of colour, shading and/or patterns
- ☐ produces a document free of wrinkles and smudges
- ☐ maintains appropriate technical standards through proofreading and editing; e.g.:
 - spelling
 - readability

Information Sharing

- ☐ communicates content of diagram/technical drawing through oral presentation
- ☐ demonstrates ability to use overlays in presentation
- ☐ poses questions based on information provided in the diagram/technical drawing

Collaboration and Teamwork

- ☐ shares work appropriately among group members
- ☐ respects the views of others
- ☐ negotiates solutions to problems

REFLECTIONS/COMMENTS

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Technical Components	4	3	2	1	0
Information Sharing	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0

STANDARD IS 1 FOR INTRODUCTORY LEVEL MODULES, 2 FOR INTERMEDIATE LEVEL MODULES, AND 3 FOR ADVANCED LEVEL MODULES

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and follows instructions
- ☐ responds to directed questions and/or follows necessary steps to find answers
- ☐ uses time effectively
- ☐ accesses basic in-school/community information sources
- ☐ interprets and organizes information logically
- ☐ transfers and/or extrapolates data from print and visual sources to create a flow chart

Technical Components

- ☐ prepares an outline of steps/processes in proper sequence and order
- ☐ organizes use of space in relation to paper size
- ☐ selects and uses appropriate drawing instruments and tools
- ☐ creates a flow chart that:
 - has a definite beginning and end
 - clearly indicates the sequencing of steps/processes
- ☐ provides arrows to indicate correct sequence of steps/processes

Technical Components (continued)

- ☐ labels flow chart components as required
- ☐ provides an appropriate title for the flow chart
- ☐ demonstrated appropriate use of colour, shading and/or patterns
- ☐ produces a document free of wrinkles and smudges
- ☐ maintains appropriate technical standards through proofreading and editing; e.g.:
 - spelling
 - legibility

Information Sharing

- ☐ communicates content of flow chart through oral presentation
- ☐ demonstrates ability to use flow chart overlays in presentation
- ☐ poses questions based on information provided in the flow chart

Collaboration and Teamwork

- ☐ shares work appropriately among group members
- ☐ respects the views of others
- ☐ negotiates solutions to problems

REFLECTIONS/COMMENTS

OBSERVATION CHECKLIST FOR FIELD-BASED INVESTIGATIONS

FOROBS

Student Name:	Module:	Date:
Destination:		
Contact Person:		
Title/Position of Contact Person:		

PURPOSE OF TRIP (Teacher Defined)

STUDENT EXPECTATIONS (What do you expect to observe/learn?)

ACTUAL OBSERVATIONS (What did you actually observe/learn?)

APPLICATIONS OF SCIENCE AND TECHNOLOGY

REFLECTION ON FIELD INVESTIGATION (What did you find most interesting? least interesting?)

<u>OBSERVED CAREERS</u>	
Career #1: Title: Education Requirements: Salary Range: Pros: Cons:	
Career #2: Title: Education Requirements: Salary Range: Pros: Cons:	
Career #3: Title: Education Requirements: Salary Range: Pros: Cons:	
<u>Would any of the observed careers appeal to you? Why or why not?</u>	

<u>SUMMATIVE CHECKLIST</u> (to be completed by teacher/supervisor)	
<i>The student:</i>	
☐ identifies trip goals and follows instructions accurately	
☐ adheres to established itinerary/timelines	
☐ demonstrates appropriate use of equipment, supplies and/or clothing	
☐ adheres to acceptable safety standards and behavioural expectations as established by school policy	
☐ accesses resources available on site	
☐ uses effective questioning techniques to gather information	
☐ interprets and records information accurately	
☐ follows directions/procedures indicated by tour guide and/or as established by industry policy while on site	
☐ completes all sections of the observation checklist for each field-based investigation.	
☐	
☐	

Assessment Criteria and Conditions:

- identifying and explaining six or more ways in which local forests (regional or provincial) have:
 - social and cultural significance (e.g., recreational, spiritual, aesthetic, medicinal)
 - economic significance (e.g., employment, product export, tourism, subsistence, tax base)
 - environmental significance (e.g., air, water and soil cycles).

Suggested Reference(s):

- *Alberta's Focus on Forests*
- *Woodlot Management Guide for the Prairie Provinces*
- *Our Growing Resource*

STANDARD: Respond to a standard of 1 on the rating scale.

Rating Scale

The student:

- 4 meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
- 3 meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
- 2 meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
- 1 completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
- 0 does not complete the task, or is unable to provide a suitable response.

N/A Not Applicable

Assessment Tools

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CTS, Forestry /G.41
(1997)

Background Information	Sample Questions/Activities
<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> • Activity 1.4: How Forests Affect the Environment • Activity 4.2: Products from Canada's Forests • Activity 5.1: Forest Values. <p>See <i>Woodlot Management Guide for the Prairie Provinces</i>, page i-6: Potential Benefits from Woodlots:</p> <ul style="list-style-type: none"> • Cash Returns • Personal Use • Insurance • Erosion Control • Windbreaks and Crop Enhancement • Winter Shelter • Landscape Aesthetics • Wildlife Habitat • Moisture Management and Snow Catching • Environmental Aspect. 	<ol style="list-style-type: none"> 1. Describe six or more ways in which local forests have social and cultural significance; e.g.: <ul style="list-style-type: none"> – recreational – spiritual – aesthetic – medicinal – community dependence. 2. Describe six or more ways in which local forests have economic significance; e.g.: <ul style="list-style-type: none"> – employment – product export – tourism – subsistence – tax base 3. Describe six or more ways in which local forests have environmental significance; e.g.: <ul style="list-style-type: none"> – wildlife and fisheries habitat – watershed protection and maintenance – water, air and soil quality – maintenance of ecosystems

DATE	EVENT	DATE	EVENT
6000 BC	Forest cover gradually regenerates over most of Canada following the ice age. Trees are used by native people as a source of food, heat, boat and home building material.	1817	First of many paper mills in Lower Canada (Quebec), built by Artemus Jackson.
3600 BC	Earliest use of paper, a papyrus document.	1819	First paper mill in the Maritimes built by Anthony Holland to supply his newspaper with paper.
105	T'sai Lun invents paper using silk, bark and hemp.	1843	Paper is still manufactured largely from linen and cotton rags. But interest in wood as a possible raw material is increasing.
1150	Moors introduce paper to Europe.		Friedrich Keller invents the process for manufacturing groundwood pulp.
1604	Samuel de Champlain establishes one of the earliest European settlements in Canada, on an island in the Saint Croix River.	1848	U.S. timber merchants and lumbermen begin setting up business in Canada, building mills and importing American workers. By the end of the century, the value of American lumber trade equals that of Britain.
1607	European settlers begin to arrive, forests are cleared for agriculture, lumber and fuel.		
1650	First sawmills appear along the St. Lawrence River and in Atlantic Canada.	1849	First sawmills appear on Vancouver Island, just outside of Victoria.
1719	A French physicist, Reaumur, states that paper can be made from the fibres of plants, including trees.	1850	Pine and oak timber is in great demand for export.
1763	American Revolution restricts British access to New England timber supply. Britain begins to exploit Atlantic Canada forests for masts and spars.	1851	The Englishmen, Hugh Burgess and Charles Watt, invent a process for manufacturing pulp by cooking wood chips in chemicals. It is called the soda process and uses caustic soda and lye.
1793	Napoleonic Wars restrict British access to Baltic timber. This initiates Canada's timber trade with Britain, an industry that continues to grow throughout the 19th century.	1860	Lumber exports begin from western Canada, mainly to South America, Australia and San Francisco.
1799	Nicolas Robert of France patents the first papermaking machine. Until this time, paper has been made entirely by hand, sheet by sheet.	1869	First groundwood pulp produced commercially in Canada at Valleyfield, Quebec by Alexander Buntin.
		1890	First tissue machine in Canada installed by E.B. Eddy at Hull, Quebec.
1803	First Canadian paper mill built at St. Andrew's, Lower Canada (Quebec), by Walter Ware and Benjamin Wales, two New Englanders. They manufacture writing, printing and wrapping papers.	1891	British Columbia prohibits exports of pulpwood from crown lands.
		1899	Elihu Stewart, the first Dominion Forester, is hired.

DATE	EVENT	DATE	EVENT
1900	As the 20th century begins, papermaking in Canada is still a small industry serving domestic needs.	1950	The gas-powered chainsaw comes into wide use in Canadian forests. The wheeled skidder called the Bonnard prehauler is introduced
1907	First forestry school in Canada opens at the University of Toronto.	1960	Government and industry increase conservation efforts; the amount of trees cut now equal the amount grown.
1912	The first forest fire protection association is formed in St. Maurice, Quebec.	1964	A large expansion of the Canadian forest industry occurs. New mills are built in every region of Canada, particularly British Columbia.
1914	The east coast lumber industry begins to decline. The best timber is depleted and Britain reestablishes links with Baltic lumber merchants.	1966	The timber quota system is introduced in Alberta to provide the forest industry with long term timber inventories.
1916	Demands on forests during World War I reduce available timber to low levels.	1975	The Forest Engineering Research Institute of Canada is established.
1918	Canada becomes the world's largest exporter of pulp and paper.	1979	The Canadian pulp and paper industry produces 20 million tonnes of pulp, paper and paperboard valued at \$8 billion.
1919	For the first time in Canada, aircraft are used for fire patrol and photographic mapping.	1987	More than 800 million seedlings are planted in an effort to make Canada's forest resource healthier and more productive.
1924	Protectionism in the U.S. closes the American market to Canadian timber.	1988	Valued at \$14 billion, pulp and paper remains Canada's most important manufacturing sector.
1926	Canada's newsprint production exceeds that of the U.S.	1990	Biodiversity in the forest becomes a major issue in Canada and the world.
1930	The Great Depression reduces pulp and paper production by one third.	19__	Canadian society insists on environmental auditing of forestry operations.
1935	West coast forest industry gradually expands to comprise half of the total Canadian lumber production.		
1939	World War II stimulates a substantial increase in the production of forest products.		
1945	Postwar exports of lumber, pulp and paper rise sharply.		
1946	The first bleach kraft pulp mill designed by Howard Rapson and Morris Wayman is built and Temiscaming, Quebec.		
1949	Ontario Department of Lands and Forests uses water bombers to fight forest fires.		

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0 N/A
Information Gathering and Processing	4	3	2	1	0 N/A
Content	4	3	2	1	0 N/A
Collaboration and Teamwork	4	3	2	1	0 N/A
Information Sharing	4	3	2	1	0 N/A

STANDARD IS 1 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and follows instructions accurately
- ☐ adheres to established timelines
- ☐ responds to directed questions and follows necessary steps to find answers
- ☐ uses time effectively

Information Gathering and Processing

- ☐ accesses basic in-school/community information sources
- ☐ uses one or more information-gathering techniques
- ☐ interprets and organizes information into a logical sequence
- ☐ records information accurately, using correct technical terms
- ☐ distinguishes between fact and fiction/opinion/theory
- ☐ responds to feedback when current approach is not working

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members

Information Sharing

- ☐ demonstrates effective use of one or more communication media:
e.g., written, oral, audio-visual
- ☐ communicates information in a logical sequence
- ☐ uses correct grammatical conventions and technical terms
- ☐ cites three or more basic information sources

Content (continued)

- ☐ distinguishes between “wants” and “needs” as they relate to consumptive practices
- ☐ explains how product marketing and promotion may affect the forest resource; e.g.:
 - media exaggeration
 - use of environmentally friendly products
- ☐ compares and contrasts the “conservation ethic” and “preservation ethic” with reference to the impact of each on the forest resource
- ☐
- ☐
- ☐

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING				
Management	4	3	2	1	0
Teamwork	4	3	2	1	0
Equipment and Materials	4	3	2	1	0
Investigative Techniques	4	3	2	1	0

STANDARD IS 1 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.

- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.

- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.

- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST*The student:***Management**

- ☐ prepares self for task
- ☐ organizes and work in an orderly manner
- ☐ carries out instructions accurately
- ☐ uses time effectively

Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members

Equipment and Materials

- ☐ selects and uses appropriate equipment/materials
- ☐ follows safe procedures/techniques
- ☐ weighs and measures accurately
- ☐ returns clean equipment/materials to storage areas

Investigative Techniques

- ☐ gathers and applies information from at least one source
- ☐ makes predictions that can be tested regarding factors affecting plant growth; e.g.:
- temperature
 - moisture
 - soil characteristics
- ☐ sets up and conducts experiments to test predictions
- ☐ distinguishes between manipulated/responding variables
- ☐ obtains results that can be used to determine if some aspect of the prediction is accurate
- ☐ summarizes important experimental outcomes regarding factors affecting plant growth
- ☐ applies experimental results in explaining the distribution of forests in Alberta
- ☐
- ☐

REFLECTIONS/COMMENTS:

Assessment Criteria and Conditions:

- explaining ways in which climate and land form affect the growth and distribution of forests.

Suggested Reference(s):

- Alberta's Focus on Forests*
- Investigating Terrestrial Ecosystems*
- Native Trees of Canada*

STANDARD: Respond to a standard of 1 on the rating scale.

Rating Scale

The student:

- meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
 - meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
 - meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
 - completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
 - does not complete the task, or is unable to provide a suitable response.
- N/A Not Applicable

Background Information	Sample Questions/Activities
<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> Activity 3.1: A Lot Depends on Location Activity 3.4: Forests: Thriving or Declining. <p>See <i>Investigating Terrestrial Ecosystems</i>:</p> <ul style="list-style-type: none"> Chapter 6: Adaptations of Organisms to Light and Soil Chapter 7: Weather, Climate and Biomes. 	<ol style="list-style-type: none"> Explain ways in which climatic factors affect the growth of trees; e.g.: <ul style="list-style-type: none"> temperature moisture Explain ways in which land form factors affect the growth of trees; e.g.: <ul style="list-style-type: none"> topography soil characteristics Integrate information about climatic and land form factors to explain species distribution within forest regions. Given a natural region of Alberta or Canada, suggest five or more reasons for the distribution of trees within that region.

ASSESSMENT CRITERIA	RATING SCALE			
	0	1	2	3
Each specimen in the collection to be assessed according to the following criteria:				
1. Completeness <ul style="list-style-type: none">specimen must include typical <u>needles/leaves, twig and terminal bud</u>cone, fruit or seed to be included where feasibleminimum size of specimen is 15 cm in length	Atypical foliage No twig or bud No cone or fruit	No twig or bud Sample too small No cone or fruit	All components present Size at minimum	All components present Size above minimum
2. Pressing: <ul style="list-style-type: none">specimen to be flattened so that the undersides of some needles/leaves face upwardno folding or bending of tissue to be evident.	Foliage not flat Underside of foliage not visible	Foliage flat Underside of foliage not visible	Foliage flat Underside of some foliage faces upward	Foliage Flat Underside of some foliage faces upward
3. Mounting: <ul style="list-style-type: none">dried specimens are attached to Bristol board with white glue or Gum Arabicconifers may be placed in Ryker mountsspecimen must occupy central position on mounting sheet (or in Ryker mount)orientation vertical or at 45° to vertical (terminal bud to top).	Substantial folding of tissue Scotch tape Horizontal or downward orientation Smears evident	Significant folding of tissue White glue Horizontal or downward orientation Minor smears or excess glue	Minor folding of tissue White glue Vertical or upward orientation Excess/insufficient glue used	All tissue laying flat White glue Vertical or upward orientation Sheet clear of smears, excess glue
4. Labelling: <ul style="list-style-type: none">family namescientific namecommon namegeographic location where collectedhabitatname of collectordate of collection	Incomplete information Incorrect sequence for more than 2 items	Habitat or location missing 1-2 items out of sequence	Complete information	Complete information Correct sequence
5. Identification: <ul style="list-style-type: none">must include common name, as well as species, genus and family names.	More than 2 categories incorrect (family, genus, species, common name)	2 of 4 categories wrong	Correct to genus only	Correct to species

STANDARD IS 2 FOR EACH SPECIMEN IN THE COLLECTION

Safety Guidelines

1. For each of the following outdoor situations, clearly describe the primary hazard(s) you would expect to encounter, and the **precautions** you would take to avoid serious problems:
 - a) a cross-country ski day-trip in the foothills in early winter
 - b) a cross-country ski day-trip in the mountains in late spring
 - c) a three-day spring canoe trip down a Class II river section
 - d) a one-day mountain climbing trip in mid-summer
 - e) a week-long hunting trip in the northern bush in early fall
 - f) a two-day summer horseback trip in the southern grasslands.
2. You are the leader of a hiking party, on a five-day backpacking trip in the Willmore Wilderness. On the third day a member of your party has fallen and appears to be seriously injured. It's getting late in the day, but you are still about an hour away from your planned campsite for the night. Clearly explain:
 - a) the **precautions** you would have taken and the plans you would have made before the trip to prepare for such an emergency
 - b) the **immediate steps** you would take to tackle this problem
 - c) the **contingencies** you would need to consider.
3. Explain the precautions you need to take **before, during and after** an outdoor trip in western Alberta to avoid problems arising from encounters with:
 - a) black bears
 - b) grizzly bears
 - c) bees
 - d) snakes
 - e) ticks
 - f) mosquitoes.

4. You are in charge of planning for a mid-winter, two-day overnight cross-country ski trip in Kananaskis Park for a group of five experienced skiers. Prepare a complete a:
 - a) personal equipment list
 - b) group equipment list.

5. You are on a one-day hiking trip in Jasper National Park with some friends. You go off on your own to fish some "good spots" around the corner. Later you discover that you are completely lost, and now it's starting to get dark.
 - a) What should be your first priority?
 - b) What actions should you take immediately?
 - c) What should you do about food, water, shelter and animals?
 - d) What steps should you take to expedite your rescue?

6. You are one of the "friends" in question #5. What steps should you and the rest of the group take when you discover that your friend is missing?

7. Describe the early symptoms of hypothermia.

8. What steps should be immediately taken if you suspect

- a) a member of your party is showing signs of hypothermia?
- b) you are beginning to suffer from hypothermia?

9. List the minimum equipment which should be included in a survival kit.

Safety Guidelines (continued)

10. Describe the primary exposure hazard(s) in each of the following situations:
 - a) hiking in the “badlands” at Dinosaur Provincial Park in mid-summer
 - b) horseback riding in the northern bush country in early spring
 - c) canoeing on the North Saskatchewan River in late fall
 - d) mountain climbing in Banff National Park in mid-summer.
11. List four sources of “tinder” generally available in the wilderness to start a survival fire.
12. List and describe three Alberta wild plants that are poisonous, and three that are edible.

Survival Techniques

1. After experiencing an emergency and identifying the nature of the situation, name five steps that might be taken to assure safety of your guests.
2. Survival and first-aid kits must be available at all times. Describe/list five or more requirements for these kits.
3. An emergency shelter may often be set up using materials and natural structures. Identify four types of shelters.
4. When selecting a location for an emergency shelter, list four factors that should be considered.
5. Name eight methods that may be used for signalling for help in a survival situation.

6. List eight steps in the use of a two-way radio.
7. As dehydration affects mental and physical performance, water is necessary for survival. List five methods of obtaining water in a survival situation.
8. List three means of ensuring safe supply of food.

Ecotourism and Capacity

1. Define:
 - a) ecotourism
 - b) carrying capacity
 - c) minimum impact/no-trace land use
2. Identify five stakeholder groups that may use the outdoor wilderness.
3. Explain when carrying capacity would be at its lowest in a specific wilderness area.
4. Name six factors that determine carrying capacity for a specific wilderness area.
5. Some of the best wildlife habitats have “an abundance of edge” (i.e., occur in areas where two ecosystems overlap). Explain what this means and give examples.

GUIDELINES FOR SAFE TRAVEL	
<i>The student:</i>	
☐ prepares and follows a schedule for travel	
☐ informs responsible person(s) of destination, route, expected date of return and number in party	
☐ selects and prepares appropriate food and equipment for trip	
☐ uses orientation and navigation skills; e.g.: ☐ interprets natural signs ☐ uses compass and map	
☐ avoids dangerous situations with wildlife; e.g.: ☐ monitors activities of wildlife in area ☐ disposes of garbage properly ☐ stores food safely ☐ maintains safe distance from wildlife	
☐ prepares for weather and seasonal conditions; e.g.: ☐ identifies hazards particular to the area ☐ listens to weather/news forecasts ☐ watches for changes in current conditions ☐ dresses according to season, weather and activity ☐ carries survival equipment	

GUIDELINES FOR SAFE TRAVEL (continued)	
☐ follows safe procedures for the use of tools and equipment; e.g.: ☐ ensures good condition prior to use ☐ demonstrates safe use/appropriate care ☐ follows safe procedures for storing and carrying	
☐ follows safety guidelines for the use of fuels; e.g.: ☐ adheres to legislation regarding fuel storage and use ☐ filters fuel before use ☐ adds fuel in ventilated area away from open flame ☐ stores fuel using safe methods	
☐ conducts self-assessment of personal performance and identifies strengths and areas that need improvement	

SETTING UP EMERGENCY SHELTER	
<i>The student:</i>	
☐ identifies type of shelter that will best protect from the elements	
☐ selects an appropriate location for shelter, considering water, fire and signalling needs	
☐ demonstrates two or more basic shelter-building techniques that involve the use of materials and/or natural structures available in the outdoors; e.g.: ☐ fallen tree shelter ☐ lean-to shelter ☐ snow cave shelter	
☐ demonstrates appropriate use of tools, equipment and safety devices	

SIGNALLING FOR HELP	
<i>The student:</i>	
☐ explains applications of the international signal for help	
☐ demonstrates three or more methods of sending rescue signals in the outdoors; e.g.:	
☐ flare signals	
☐ fire signals	
☐ mirror signals	
☐ sound signals	
☐ information signals	
☐ demonstrates methods for sending ground to air signals; e.g.:	
☐ evergreen boughs	
☐ tramped snow	
☐ use of contrasting materials	

MINIMUM IMPACT LAND USE (continued)	
☐ picks up other people's garbage, and carries out everything carried into the camp site	
☐ demonstrates techniques for protecting and managing natural water supply; e.g.:	
☐ establishment of wash area	
☐ disposal techniques for waste water	
☐ adheres to local fire restrictions	
☐ uses existing fire box/pit whenever possible, and guards against flying embers	
☐ builds fire away from roots and branches, and uses driftwood or deadfall for fire fuel whenever possible.	
☐ follows marked paths and avoids ecologically sensitive areas	
☐ considers carrying capacity of the area, and avoids nesting/spawning areas and young animals	
☐ avoids removing plants and wildflowers, and disturbing sediment in streams	
☐ critically examines outdoor procedures and suggests future refinements to land use practices	
☐	

STANDARD IS IN LINE EACH APPLICABLE TASK AREA	
Rating Scale	
<i>The student:</i>	
4 Exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.	
3 Meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.	
2 Meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.	
1 Meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.	
0 Has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.	
N/A Not applicable	
RELECTIONS/COMMENTS	

[The 1997 text was deleted September 1999.]

TASK	OBSERVATION/RATING				
Allocating Time and Materials	4	3	2	1	0
Building the Portfolio	4	3	2	1	0
Presenting and Critiquing	4	3	2	1	0
					N/A

STANDARD IS 1 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST

The student:

Allocating Time and Materials

- ☐ develops and follows a schedule of activities for preparing a portfolio of maps and aerial photographs used in forestry
- ☐ uses personal initiative to formulate questions and find answers; identifies parameters within which problems must be solved
- ☐ accesses a range of relevant in-school and community resources
- ☐ shares information with others for feedback and collaboration
- ☐ plans and uses time effectively
- ☐ assesses and refines approach to task and project status based on feedback and reflection

Building the Portfolio

- ☐ constructs four or more different types of maps used in forestry; e.g.:
 - base map
 - topographic/contour map
 - soil type map
 - forest stand map
- ☐ identifies characteristics and applications of each type of map included in the portfolio
- ☐ develops a one-page report on the National Topographic Grid System and its application in providing legal land descriptions
- ☐ displays one or more examples of aerial photographs

Building the Portfolio (continued)

- ☐ explains the purpose and techniques of aerial photography, and applications of different types of film used
- ☐ provides a summary of current information-gathering technologies and their applications in mapping; e.g.:
 - satellite imagery
 - Global Positioning Systems (GPS)

Presenting and Critiquing

- ☐ demonstrates effective use of two or more communication media in presenting the portfolio; e.g., *written, oral, audio-visual*
- ☐ communicates ideas in a logical sequence with sufficient supporting detail
- ☐ maintains acceptable grammatical and technical standards
- ☐ provides an introduction that describes the purpose and scope of the portfolio
- ☐ relates final outcomes and products to original purpose, and identifies strengths and areas for improvement
- ☐ cites five or more relevant information sources
- ☐ conducts collaborative assessment of processes used and outcomes achieved

REFLECTIONS/COMMENTS:

ALLOCATING TIME AND MATERIALS	
<i>The student:</i>	develops and follows a schedule of activities for each orienteering task
☐	
☐	selects and uses appropriate equipment and materials
☐	uses appropriate safety devices; e.g.: ☐ protective clothing ☐ protective eye wear ☐ hard hats
☐	recognizes potential hazards and takes steps to eliminate/avoid them
☐	critically examines task performance, identifying strengths and areas that need improvement

BASIC COMPASS AND MEASUREMENT SKILLS (continued)	
<i>The student:</i>	☐ orients a forestry map using a compass: ☐ places compass on map with edge along desired line of travel ☐ rotates the capsule until the "N" on the compass dial points to true north on the map ☐ checks to ensure that north-south lines are parallel with the map's meridians ☐ reads the bearing at the top of the compass
☐	obtains a bearing from a map using a forestry compass: ☐ sets the compass for the desired bearing of travel ☐ holds the compass level and turns body until north end of the needle aligns with 0 degrees (compass north) ☐ walks in direction of bearing, citing landmarks and checking course
☐	measures direction using a Douglas protractor
☐	applies knowledge of the National Topographic Grid System in locating a parcel of forested land; e.g.: ☐ given its legal land description, locates a specific parcel of land on a map ☐ given a specific parcel of land on a map, identifies its legal land description
☐	estimates/calculates distance and area on a forestry map
☐	

BASIC COMPASS AND MEASUREMENT SKILLS	
<i>The student:</i>	☐ reads and interprets maps and aerial photographs used in forestry; e.g.: ☐ legend and symbols ☐ scale ☐ colours ☐ contour lines
☐	constructs a mental image of a forested area from information conveyed through maps and aerial photographs
☐	orients a forestry map through inspection of surroundings

STANDARD IS 1 IN EACH APPLICABLE TASK

Rating Scale

The student:

4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.

3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.

2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.

1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.

0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

REFLECTIONS/COMMENTS

Assessment Criteria and Conditions:

- describing topography and forest cover for a given area based on information gathered from:
 - an aerial photograph and corresponding parts of a forest type map
 - two or more different types of aerial photographs (e.g., black and white, colour, infrared, satellite imagery)

Suggested Reference(s):

- *Managing the Forest*

STANDARD: Respond to a standard of 1 on the rating scale.

Rating Scale

The student:

- 4 meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
 - 3 meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
 - 2 meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
 - 1 completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
 - 0 does not complete the task, or is unable to provide a suitable response
- N/A Not Applicable

Background Information	Sample Questions/Activities
<p>See <i>Managing the Forest</i>:</p> <p><u>Maps</u></p> <ul style="list-style-type: none"> • Topographic Map Interpretation • Contour Mapping <p><u>Air Photographs</u></p> <ul style="list-style-type: none"> • Photo Mosaic • Drainage Patterns • Stereogram 	<ol style="list-style-type: none"> 1. Read and interpret maps and aerial photographs, explaining information conveyed through: <ul style="list-style-type: none"> – legend and symbols – scale – colours – contour lines. 2. Construct a “mental image” of land terrain as conveyed through a map. 3. Use maps to estimate and calculate: <ul style="list-style-type: none"> – distance – area. 4. Demonstrate applications of aerial photographs in the stereoscopic viewing of topographic features. 5. Compare details of forest type maps and aerial photographs with existing ground conditions.

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0 N/A
Information Gathering and Processing	4	3	2	1	0 N/A
Content	4	3	2	1	0 N/A
Collaboration and Teamwork	4	3	2	1	0 N/A
Information Sharing	4	3	2	1	0 N/A

STANDARD IS 1 IN EACH APPLICABLE TASK**Rating Scale**

The student:

4. exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
3. meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
2. meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.

1. meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.

0. has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

G.56/ Forestry, CTS
(1997)

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and follows instructions accurately
- ☐ adheres to established timelines
- ☐ responds to directed questions and follows necessary steps to find answers
- ☐ uses time effectively

Information Gathering and Processing

- ☐ accesses basic in-school/community information sources
- ☐ uses one or more information-gathering techniques
- ☐ interprets and organizes information into a logical sequence

- ☐ records information accurately, using correct technical terms

- ☐ distinguishes between fact and fiction/opinion/theory

- ☐ responds to feedback when current approach is not working

Content

- ☐ suggests reasons for conducting a forest survey;

e.g.:

- types of information gathered
- questions that are answered
- ☐ distinguishes between forest samples and forest populations, and provides examples of each

Content (continued)

- ☐ describes basic techniques used to sample a forested area; e.g.:
 - layout of sample plots
 - data collection techniques
- ☐ explains applications of the clinometer, increment borer and diameter tape in data collection
- ☐ explains how sample data may be used to estimate fibre volumes and other nonfibre forest resources
- ☐ provides a glossary of terms relevant to conducting a forest survey

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members

Information Sharing

- ☐ demonstrates effective use of one or more communication media:
 - e.g., written, oral, audio-visual
- ☐ communicates information in a logical sequence
- ☐ uses correct grammatical conventions and technical terms
- ☐ cites three or more basic information sources

REFLECTIONS/COMMENTS:

ALLOCATING TIME AND MATERIALS
<p><i>The student:</i></p> <p>☐ follows a schedule of activities for each orienteering task</p>
<p>☐ selects and uses appropriate equipment and materials</p>
<p>☐ uses appropriate safety devices; e.g.:</p> <p>☐ suitable clothing</p> <p>☐ protective eye wear</p> <p>☐ hard hat</p>
<p>☐ recognizes potential hazards and takes steps to eliminate/avoid them</p>
<p>☐ critically examines task performance, identifying strengths and areas that need improvement</p>

BASIC COMPASS AND MEASUREMENT SKILLS
<p><i>The student:</i></p> <p>☐ orients a map using a compass:</p> <p>☐ places compass on map with edge along desired line of travel</p> <p>☐ rotates the capsule until the "N" on the compass dial points to true north on the map</p> <p>☐ checks to ensure that north-south lines are parallel with the map's meridians</p> <p>☐ reads the bearing at the top of the compass</p>

BASIC COMPASS AND MEASUREMENT SKILLS (continued)
<p><i>The student:</i></p> <p>☐ establishes and follows a bearing using a compass:</p> <p>☐ sets the compass for the desired bearing of travel</p> <p>☐ holds the compass level and turns body until north end of the needle aligns with 0 degrees (compass north)</p> <p>☐ walks in direction of bearing, citing landmarks and checking course</p>
<p>☐ performs a closed traverse, error in closure no greater than 5% of perimeter distance:</p> <p>☐ starts at 0 degrees and walk 10 metres. Places stick in ground at this point</p> <p>☐ adds 90 degrees onto compass, setting it at 90 degrees. Aligns north end of needle with 90 degrees. Walks 10 metres in this direction using a measuring chain as guide. Places stick in ground at this point</p> <p>☐ adds 90 degrees onto compass, setting it at 180 degrees. Aligns north end of needle with 180 degrees. Walks 10 metres in this direction. Places stick in ground at this point</p> <p>☐ adds 90 degrees onto compass, setting it at 270 degrees. Aligns north end of needle with 270 degrees. Walks 10 metres in this direction. Returns to within one metre of starting point</p>

STANDARD IS 1 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

REFLECTIONS/COMMENTS

ALLOCATING TIME AND MATERIALS	
<i>The student:</i>	
☐	follows a schedule of activities for each orienteering task
☐	selects and safely uses appropriate equipment and materials
☐	uses appropriate safety devices; e.g.: ☐ suitable clothing ☐ protective eye wear ☐ hard hat
☐	recognize potential hazards and takes steps to eliminate/avoid them.

BASIC FOREST MEASUREMENT (continued)	
☐	measures the height of 10 trees, accurate to within 5% on at least 8 trees, using a clinometer ☐ measures 15 metres from the base of the tree ☐ uses clinometer to determine elevation at this point in relation to base of the tree ☐ aims clinometer at top of tree and reads height in metres ☐ adjusts tree height to compensate for elevation in relation to base of the tree.
☐	measures the age of 10 trees, accurate to within 5% on at least 8 trees, using an increment borer ☐ attaches boring bit to outer casing of increment borer ☐ moves the boring bit into at least the centre of the tree at breast height by turning clockwise ☐ inserts the core sampler into the boring bit and gives the borer one complete counter clockwise turn ☐ slides the extracting tool gently between the core and borer and carefully withdraws both core and tool ☐ determines tree age by counting rings on the core ☐ places core sample back into the tree and seals boring hole ☐ removes accumulations of resin and dirt from increment borer.
☐	

BASIC FOREST MEASUREMENT	
<i>The student:</i>	
☐	measures horizontal distances up to 25 metres, accurate to within 5% ☐ using pacing techniques ☐ using a forester's chain
☐	measures the diameter of 10 trees at approximately 1.5 metres above ground level, each accurate to within 5%, using a diameter tape ☐ places sharp end of tape in tree at breast height ☐ wraps tape around tree and determines tree circumference ☐ accurately reads/calculates tree diameter at breast height (DBH)
☐	

TABULATING AND PRESENTING RESULTS	
<i>The student:</i>	
☐	makes accurate observations and inferences regarding tree measurements
☐	records data accurately and systematically (e.g., use a dot-dash tally)
☐	considers limitations and generalizability of the results of measurement
☐	reflects on procedures/outcomes/task performance and suggests refinements.

STANDARD IS 1 IN EACH APPLICABLE TASK**Rating Scale***The student:*

4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.

3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.

2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.

1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.

0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

ALLOCATING TIME AND MATERIALS	
<i>The student:</i>	
☐ follows a schedule of activities for conducting a forest survey	
☐ selects and safely uses appropriate equipment and materials	
☐ uses appropriate safety devices; e.g.: ☐ suitable clothing ☐ protective eye wear ☐ hard hat	
☐ recognizes potential hazards and takes steps to eliminate/avoid them.	

CONDUCTING THE FOREST SURVEY (continued)	
<i>The student:</i>	
☐ records data regarding tree height and age, by species, using grid system and charts	
☐ calculates fibre volume by species on a per hectare basis using sample plot data	
☐	

INTERPRETING SURVEY RESULTS

<i>The student:</i>	
☐ demonstrates an understanding of problems encountered in conducting a forest survey	
☐ records data accurately and systematically	
☐ interprets sample data to make inferences regarding tree populations and fibre volume	
☐ considers limitations of sampling techniques and survey results	
☐ critically examines procedures/outcomes/ task performance and suggests refinements	
☐	

CONDUCTING THE FOREST SURVEY	
<i>The student:</i>	
☐ establishes boundaries for a 100 square metre sample forest plot	
☐ subdivides the plot into a number of subplots by extending string lines across the plot between two sides	
☐ measures tree diameter by species, each accurate to within 5%, for all trees in the plot larger than 9.1 cm DBH	
☐ records data regarding tree diameter, by species, using grid system and charts	
☐ measures the height and age of 10 of the tallest trees in the plot, accurate to within 5% on at least 8 trees	

STANDARD IS 1 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.
- N/A Not Applicable

REFLECTIONS/COMMENTS

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0 N/A
Information Gathering and Processing	4	3	2	1	0 N/A
Content	4	3	2	1	0 N/A
Collaboration and Teamwork	4	3	2	1	0 N/A
Information Sharing	4	3	2	1	0 N/A

STANDARD IS 1 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

G.60/ Forestry, CTS
(1997)**TASK CHECKLIST***The student:***Preparation and Planning**

- ☐ sets goals and follows instructions accurately
- ☐ adheres to established timelines
- ☐ responds to directed questions and follows necessary steps to find answers
- ☐ uses time effectively

Information Gathering and Processing

- ☐ accesses basic in-school/community information sources
- ☐ uses one or more information-gathering techniques
- ☐ interprets and organizes information into a logical sequence
- ☐ records information accurately, using correct technical terms
- ☐ distinguishes between fact and fiction/opinion/theory
- ☐ responds to feedback when current approach is not working

Content

- ☐ identifies living and non-living elements within a local forest ecosystem; e.g.:
 - soil characteristics
 - land form
 - climate
 - flora and fauna
 - soil organisms
- ☐ describes interrelationships among at least three living and three nonliving elements within a local forest environment; e.g.:
 - relationship of soil, air, water characteristics to plant growth
 - interactions and dependencies among living organisms

Content (continued)

- ☐ explains the role of trees within a local forest ecosystem; e.g.:
 - exchange of gases
 - water cycle
 - nutrient cycling (macro nutrients)
 - wildlife habitat
 - soil conservation
 - energy flow
- ☐ analyzes food relationships among living organisms within a local forest environment; e.g.:
 - role of producers, consumers and decomposers
 - food chains and webs
- ☐ describes the distribution of dominant species within a local forest environment on the basis of habitat requirements; e.g.:
 - common tree species
 - flowering plants of the understory
 - common mammals and birds

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members

Information Sharing

- ☐ demonstrates effective use of one or more communication media: e.g., *written, oral, audio-visual*
- ☐ communicates information in a logical sequence
- ☐ uses correct grammatical conventions and technical terms
- ☐ cites three or more basic information sources

REFLECTIONS/COMMENTS:

Assessment Criteria and Conditions:

- identifying and describing major tree parts (including roots, trunk, branches, leaves, flowers), their function and relationship to one another

Suggested Reference(s):

- Alberta's Focus on Forests*

STANDARD: Respond to a standard of 1 on the rating scale

Rating Scale

The student:

- meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
- meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
- meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
- completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
- does not complete the task, or is unable to provide a suitable response.

N/A Not Applicable

Background Information	Sample Questions/Activities
<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> Activity 2.1: Finding the Light Activity 2.2: Tree Waterworks I Activity 2.3: Tree Waterworks II Activity 2.4: Differences in Design Activity 2.5: Tree Keys Activity 2.6: New Trees from Old Activity 2.7: How Trees Grow 	<p>1. Explain vital life processes performed by trees and other forest plants; e.g.:</p> <ul style="list-style-type: none"> nutrient uptake and transportation photosynthesis respiration and transpiration reproduction phenology (leaf flushings, leaf fall, flowering and cone production) <p>2. Provide labelled diagrams of major tree parts; e.g.:</p> <ul style="list-style-type: none"> root trunk/stem branch/twig leaf flower <p>3. Describe the function of major tree parts in performing vital life processes.</p> <p>4. Describe interrelationships among tree structures, their functions, and vital life processes that are performed.</p> <p>5. Describe major stages in the life cycle of a native tree.</p> <p>6. Describe the role of trees in the water cycle.</p>

TASK	OBSERVATION/RATING				
Management	4	3	2	1	0 N/A
Teamwork	4	3	2	1	0 N/A
Equipment and Materials	4	3	2	1	0 N/A
Investigative Techniques	4	3	2	1	0 N/A

STANDARD IS 1 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST*The student:***Management**

- ☐ prepares self for task
- ☐ organizes and works in an orderly manner
- ☐ carries out instructions accurately
- ☐ uses time effectively

Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members

Equipment and Materials

- ☐ selects and uses appropriate equipment/materials
- ☐ follows safe procedures/techniques
- ☐ weighs and measures accurately
- ☐ returns clean equipment/materials to storage areas

Investigative Techniques

- ☐ gathers and applies information from at least one source
- ☐ makes predictions that can be tested regarding at least three vital life processes performed by trees; e.g.:
- nutrient uptake and transportation
 - photosynthesis
 - respiration
 - transpiration
 - reproduction
 - phenology
- ☐ sets up and conducts experiments to test predictions
- ☐ distinguishes between manipulated/responding variables
- ☐ obtains results that can be used to determine if some aspect of the prediction is accurate
- ☐ summarizes important experimental outcomes, relating structural units of the tree to their function in performing life processes

REFLECTIONS/COMMENTS:

Assessment Criteria and Conditions:

- identifying and explaining:
 - past and present uses of forests in Alberta and Canada
 - ways in which changes in forest use (and management) have affected the economy and the environment

Suggested Reference(s):

- Alberta's Focus on Forests*
- Our Growing Resource*

STANDARD: Respond to a standard of 1 on the rating scale.

Rating Scale

The student:

- meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
- meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
- meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
- completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
- does not complete the task, or is unable to provide a suitable response

N/A Not Applicable

Assessment Tools

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Background Information	Sample Questions/Activities
<p>See <i>Alberta's Focus on Forests</i>:</p> <p><u>Unit 4 - Forest Resources and Technologies</u></p> <ul style="list-style-type: none"> Activity 4.1: Trees of Alberta and Canada Activity 4.2: Products from Canada's Forests Activity 4.3: Surveying the Forest Resource Activity 4.4: From Pulp to Paper <p><u>Unit 5 - Forest Management for All</u></p> <ul style="list-style-type: none"> Activity 5.1: Forest Values Activity 5.2: Decision for Change Activity 5.3: Forest Perspectives 	<ol style="list-style-type: none"> Provide an overview of changing patterns of forest use in Canada and Alberta from past to present; e.g.: <ul style="list-style-type: none"> aboriginal use fur trade land clearing for agriculture ship building urbanization sawmilling pulp and paper value-added products recreational uses. Describe the history of forest land administration in Canada and Alberta; e.g.: <ul style="list-style-type: none"> Federal jurisdiction Provincial status <i>Natural Resources Transfer Act</i>. Suggest three or more ways in which changes in forest use (and management) have affected: <ul style="list-style-type: none"> the economy the environment. Make predictions regarding the future use (and management) of forests in Alberta and Canada.

Assessment Criteria and Conditions:

- definitions and examples of sustainable yield and sustainable development within the context of Alberta's forested regions

Suggested Reference(s):

- *Our Growing Resource*
- *Forestline*

STANDARD: Respond to a standard of 1 on the rating scale.

Rating Scale

The student:

- 4 meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
- 3 meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
- 2 meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
- 1 completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
- 0 does not complete the task, or is unable to provide a suitable response.

N/A Not Applicable

Background Information	Sample Questions/Activities
<p>See <i>Our Growing Resource</i>, Chapter 2 - The Challenge of Sustainable Development:</p> <ul style="list-style-type: none"> • Managing Forest Development • Integrated Resource Management - Accommodating Many Uses • Harvest Planning and Practices • Reforestation • Air and Water Quality • Building Sustainable Businesses. 	<ol style="list-style-type: none"> 1. What does "sustainable yield" and "sustainable development" mean to you? Defend your response with information gathered through research (e.g., Alberta Environmental Protection). 2. Discuss the meaning of the following definition of sustainable forest management: <i>"the development of forests to meet current needs without prejudice to their future productivity, ecological diversity, or capacity for regeneration."</i> 3. Identify and explain major components/ considerations in sustainable forest management; e.g.: <ul style="list-style-type: none"> – timber resources – biodiversity of wildlife – air, land and water quality. 4. Interview representatives of three or more different forest industry organizations regarding their approach to sustainable forest management; e.g.: <ul style="list-style-type: none"> – priorities – actions. 5. Identify current research projects underway that are intended to support sustainable forestry practices.

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Content	4	3	2	1	0
Presenting/Reporting	4	3	2	1	0
	N/A				

STANDARD IS 1 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST*The student:***Preparation and Planning**

- ☐ sets goals and follows instruction accurately
- ☐ responds to directed questions and follows necessary steps to find answers
- ☐ accesses basic in-school/community information sources
- ☐ interprets and organizes information into a logical sequence
- ☐ records information accurately, using correct technical terms
- ☐ uses time effectively

Content

- ☐ provides a clear and concise statement of an issue regarding management of a forested region
- ☐ examines social, political, scientific, ethical, economic and/or environmental perspectives related to the issue
- ☐ explains why the issue is important by providing examples of possible consequences and their impact on sustainable yield and sustainable development
- ☐ states a position regarding the issue, and develops a logical argument and rationale for the position taken

Content (continued)

- ☐ develops a plan of action for dealing with the issue at local and/or global levels
- ☐ provides a glossary of terms relevant to the issue
- ☐
- ☐
- ☐

Presenting/Reporting

- ☐ demonstrates effective use of at least one medium of communication:
e.g., Written: *spelling, punctuation, grammar, basic format*
Oral: *voice projection, body language*
Audio-Visual: *techniques, tools*
- ☐ uses correct grammatical convention and technical terms through proofreading/editing
- ☐ provides an introduction that describes the purpose of the project
- ☐ communicates information in a logical sequence
- ☐ states a conclusion based on a summary of facts
- ☐ provides a reference list of three or more basic information sources

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0 N/A
Information Gathering and Processing	4	3	2	1	0 N/A
Content	4	3	2	1	0 N/A
Collaboration and Teamwork	4	3	2	1	0 N/A
Information Sharing	4	3	2	1	0 N/A

STANDARD IS 1 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

G.66/ Forestry, CTS
(1997)**TASK CHECKLIST***The student:***Preparation and Planning**

- ☐ sets goals and follows instructions accurately
- ☐ adheres to established timelines
- ☐ responds to directed questions and follows necessary steps to find answers
- ☐ uses time effectively

Information Gathering and Processing

- ☐ accesses basic in-school/community information sources
- ☐ uses one or more information-gathering techniques
- ☐ interprets and organizes information into a logical sequence
- ☐ records information accurately, using correct technical terms
- ☐ distinguishes between fact and fiction/opinion/theory

- ☐ responds to feedback when current approach is not working

Content

- ☐ cites reasons for protecting the forest resource; e.g.:
- material and non-material benefits
 - environmental impact
- ☐ identifies and describes major components of forest protection; e.g.:
- forest fire management
 - soil conservation and land reclamation
 - pest and disease control

Content (continued)

- ☐ explains basic goals and techniques of forest fire management, soil conservation and land reclamation
- ☐ identifies and describes symptoms of common forest pests and diseases
- ☐ compares different methods of pest and disease control; e.g.:
- biological methods
 - forest management
 - chemical methods

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members

Information Sharing

- ☐ demonstrates effective use of one or more communication media: e.g., *written, oral, audio-visual*
- ☐ communicates information in a logical sequence
- ☐ uses correct grammatical conventions and technical terms
- ☐ cites three or more basic information sources

REFLECTIONS/COMMENTS:

COLLECTING/PHOTOGRAPHING PEST PROBLEMS	
<i>The student:</i>	collects, photographs and/or observes six or more instances of pest damage evident in a forest environment
☐	
☐	identifies and describes forest site and/or forest stand factors associated with each instance of pest damage
☐	

RECOMMENDING PREVENTION/ CONTROL STRATEGIES	
<i>The student:</i>	uses information provided in the <i>Identification Key for Forest Pests</i> (FOR1100-6) to recommend appropriate prevention/control strategies for each of four pests identified
☐	
☐	

STANDARD IS 1 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

REFLECTIONS/COMMENTS

USING THE IDENTIFICATION KEY TO IDENTIFY FOREST PESTS	
<i>The student:</i>	explains basic terminology used in the <i>Identification Key for Forest Pests</i> (FOR1100-6)
☐	
☐	explains steps in using a dichotomous key to identify pests or pest damage
☐	uses the identification key to correctly identify four or more forest pests and/or instances of pest damage
☐	

Introduction

This identification guide includes only the most common insects and diseases that affect the forests of Alberta. It comprises the following identification keys:

- Key 1: General
- Key 2: Physical Injury
- Key 3: Disease
- Key 4: Animal/Insect Damage

Each key is not exhaustive in the pests and pest damages it can be used to identify. Together the keys serve only as a beginner's guide to the identification of some common forest pests in Alberta.

Each identification key is based on information provided from the following source:

Finck, Kelly E., P. Humphreys and G. Hawkins. 1989. *Field Guide to Pests of Managed Forests in British Columbia*. Forestry Canada and B.C. Ministry of Forests, Victoria, B.C. Joint Publ. No. 16. 188p.

Using the Keys

There are various factors/agents that cause damage in forest stands and in wood products. These can be grouped into the following categories:

- disease
- physical (abiotic) injury—primarily owing to climatic and soil factors
- animal damage
- insect damage.

When identifying the cause of damage in a forest stand we usually focus attention on the symptoms because they are visible. The first step is to use the General Key to determine which of the above agents of change are responsible.

Notice that each key provides two choices, e.g.:

- a. whole tree affected
- b. part of the tree affects.

Read both choices before selecting the appropriate one.

Glossary of Terms

Chlorotic:	yellowish foliage owing to lack of chlorophyll
Frass:	solid excrement and chewed debris from insects, especially larvae
Galleries:	wandering tunnels or cavities under bark or in wood, associated with bark beetles or wood borers
Pitch tube:	a lump of pitch accumulating on the outside of the bark of a conifer resulting from pitch flow caused by bark beetle attack
Resinosis:	an abnormal flow of pitch from a conifer usually in response to infection, insect activity or wounding

KEY 1: GENERAL

a. Whole tree affected

- a. Crown entirely or partially discoloured, bright yellow, brown or red or lacking leaves or needles; trees may be broken, laying on the ground or standing and lower stem buried in sediment; crown, if present, may not be deformed
- b. Widespread area affected, especially in low lying areas or in bands along slopes, near industrial sites, adjacent to streams or on lower slopes in mountainous terrain; trees in small clumps are uniformly affected
- c. Trees affected randomly and to a varying extent
- d. Sap present of stem or at root collar
 - e. Sap at root collar
 - f. Sap, mycelia, mushrooms or bracket fungi around root collar
- f. Sap, tunnels, bark and wood fragments around root collar, roots chewed

Key 3: Disease 1

Key 4: Animal/Insect Damage

- e. Sap, swelling, cankers or bracket fungi on main stem or branches

Key 3: Disease 1

- f. Bark removal from stems or roots

Key 4: Animal/Insect Damage

- b. Crown thin, yellow, poor growth, crown not generally deformed
- g. Widespread area affected, impact on trees quite uniform, no evidence of disease. No evidence of industrial site nearby nor are trees on poor sites

Key 2: Physical Injuries

- g. Affected trees in patches or scattered individuals, standing dead and/or windthrown trees; trees affected to varying degrees

Key 3: Disease 1

a. Part of tree affected

- h. Foliage, leaders and/or branch tips affected
- h. Main stem and/or branches affected
- a. Trees erect or windthrown in random manner, cankers, fungi, sap, brooms or swellings
- i. No cankers, fungi, sap, brooms or swellings
- j. Splintered or broken main stem, top and/or branches, windthrown trees lying in all the same direction
- j. Pitch, frass or cottony tufts present, branch or main stem gouting and/or breakage which may or may not be present

Key 1: General 2

Key 3: Disease 1

Key 2: Physical Injuries

Key 4: Animal/Insect Damage

a. Foliage affected

- b. Trees affected in widespread area, especially in low lying areas or in bands along slopes
- b. Trees affected in large to small areas, generally to varying extent
- c. Needles uniformly coloured or mottled, small fruiting bodies or blisters present, main stems or branches may not be affected
- c. Extensive loss of leaves or needles, or needles uniformly discoloured or mottled, generally from the top of crown downward and from the tips inward. Chewed or clipped needles, mined buds, exit holes, silk and/or insects present

Key 2: Physical Injuries 1

Key 3: Disease 1

Key 4: Animal/Insect Damage

a. Leaders and/or branch tips affected

- d. Bark removed or tips clipped off
- d. Bark not stripped, tips and/or buds not clipped
- e. Tips may or may not curl, buds or needles mined, exit holes, frass, silk or cottony tufts present

Key 4: Animal/Insect Damage

Key 4: Animal/Insect Damage

- e. Tips discoloured
- f. Small dark fruiting bodies or white to orange blisters or cankers on bark
- f. Buds mushy, in low lying areas or industrial site nearby

Key 3: Disease 1

Key 2: Physical Injuries

KEY 2: PHYSICAL INJURIES**Physical Injuries 1: Injuries to Crown/Foliage or Tips**

- a. Tree leaning, windthrown or laying on ground
- a. **Tree erect**

Key 2: Physical Injuries 2

- b. Damage to main stem and/or branches

Key 2: Physical Injuries

- b. Damage to crown
 - c. Foliage discoloured or leaders and branch tips damaged
 - c. Tips of leaders, branches affected (including buds). Damage most intense in depressions. Buds, new shoots, and needles brown in spring. Shoots and needles brown in fall. Mushy buds, all species in a stand may be affected.

Frost Damage

- c. Foliage discolouration not restricted to the leaders, branches or branch tips. No evidence of insects, animals or disease. No industrial site nearby, generally no noticeable discolouration or death of deciduous and/or shrub layer. Crown in deep red-brown to brown

- d. Damage in a band along a slope

Red Belt Injury

- d. Damage does not extend in a band along a slope; needles, if any, lacking flecking

- e. Crown is brown from top down and from new to old needles; needles may drop especially in late summer

Drought Damage

- e. Crown devoid of foliage or entire crown reddish brown, scorched appearance, evidence of burned bark

Fire Damage**Physical Injuries 2: Injuries to Main Stem/Branches or Whole Tree**

- a. Tree leaning, windthrown or broken; young to mature trees
- b. Trees windthrown or broken
 - c. Trees blown over, crown intact, root "mats" present, trees lie in one direction, branches and stem of adjacent trees may be scarred or splintered
- c. Evidence of numerous broken trees aligned at right angles to the slope on steep middle and lower slopes. Sharp line between old and young trees, damaged area may be occupied by shrubs and forbs

Wind Damage

- b. Young trees bent over or deformed, older trees with uneven and splintered breakage of tops and/or upper branches, cankers not evident

Avalanche Damage**Snow or Ice Damage**

- a. **Tree erect, damage to main stem and/or branches**
 - d. Bark removal of main stem generally evident
 - e. Main stem severely debarked and deeply gouged, exposed wood splintered, evidence of logging or construction activities adjacent, may also be associated with adjacent windfall

Mechanical Damage

- e. Main stem may be debarked but no evidence of gouging, splintering on wood; evidence of burned branch ends and charcoal

Fire Damage

- d. Main stem not severely damaged
 - f. Branches and/or tops broken or splintered, cankers not evident

Snow or Ice Damage

- f. Branches and/or top not broken or splintered
 - g. Upper surface of branches have wounds or scars associated with green ragged crown, scars may or may not be on main stem

Hail Damage

- g. Scars on main stem, bark removed from scar or lower stem buried
 - h. Extended scars at ground level

Fire Scar

- h. Lower section of stem buried by sediment from adjacent stream

Flood Damage

KEY 3: DISEASE

Disease 1: Diseases of roots and those affecting more than one kind of tissue

a. Whole tree affected

No cankers; scattered pockets of trees with thick chlorotic crown with poor growth or standing dead, wind toppled trees in crisscross pattern, trees of all ages affected

Root Rots

a. Part of tree affected

b. Part of crown affected

Crown red, dead top and/or branches, cankers on main stem and/or branches – on pines only

b. Either foliage or stem and/or branches affected

c. Young to mature stand with conks, flattened areas, swellings or brooms

Key 3: Disease 2

Key 3: Disease 2

d. No brooms or aerial shoots

Key 3: Disease 2

d. Brooms present, minor needle discoloration, no blisters on needles, aerial shoots or basal cups on swollen areas of branches and brooms. Branch pattern whorled

Lodgepole Pine Dwarf Mistletoe

Disease 2: Cankers, Rusts and Trunk Rots

a. Various types of conks visible on tree trunks or bracket fungi on ground near base of tree

Trunk Rot

a. Absence of conks or bracket fungi on stem or near base of tree

b. No noticeable swelling on stem, dead areas consist of flattened or depressed tissue, dead bark may have peeled off stem

c. On Aspen, rough, flattened area, black cracked bark

Hypoxylon Canker

c. On Lodgepole Pine, elongated sunken, perennial canker, usually on the lower bole. Sap, branch flagging, blue-black stain in sapwood under the canker

Atropellis Canker

b. Spindle to oval-shaped swellings present on pines, raised areas on main stem and/or branches. Noticeable blistering of bark, sometimes extended scars. Fruiting structures are white, yellow or orange powdery blisters

Pine Stem Rusts

IDENTIFICATION KEY FOR FOREST PESTS (continued)

KEY 4: ANIMAL/INSECT DAMAGE**Animal Damage**

- a. **Bark removed from roots, branches or stem**
- b. Bark removed from buried roots
- b. Bark removed from branches and/or main stem
- c. Damage below 2.5 m
- d. Bark stripped from main stem and branches
- e. Bark pulled away in large strips, tooth and claw marks on sapwood
- e. Shredded bark remaining on tree, long vertical tooth marks
- d. Bark and sapwood gnawed
 - f. Shallow gnaw marks
 - g. Exposed sapwood has rough appearance
 - g. Exposed sapwood fairly smooth
- f. Deep gnaw marks, distinct tooth marks
- c. Damage above 2.5 m
 - h. Shallow gnaw marks
 - h. Deep gnaw marks
- a. **Stems and/or branches cut or damage to foliage**
 - i. Stems and/or branches cut, multiple chips to 4 cm long at base of tree or branch

Beaver**Insect Damage**

- a. **Entire crown affected**
- b. Coniferous hosts. Needles chewed to varying degrees, needle stubs may or may not remain on the tree
- b. Deciduous hosts
- Defoliators (Sawflies or Budworms)**
- Defoliators (Tent Caterpillars, Leaf-Eating Beetles, Leaf Miners)**
- a. **Leaders and branches, stems, roots or cones affected**
- c. Leaders and branches affected
- c. Main stems affected
 - d. Entire tree dying. Crown yellow or reddish brown: boring dust around base of tree, tunnels on inside of bark
 - d. Tree may be alive or dead; may have presence of sap flow from insect entrance holes; insect feeding penetrates deeply into wood
- c. Roots or root collar area affected. Pitch tubes at root collar. Sap soaked duff near root collar. Trees up to 3 m tall are most susceptible, entire crown may be reddish
- c. Cones and/or seed affected
 - g. Pitch and silk webbing present on the exterior of the cone
 - h. Absence of pitch and silk. Exit holes on exterior of cone may be visible

Terminal Weevils**Bark Beetles****Wood Borers or Carpenter Ants****Warren's Root Collar Weevil****Coneworms****Chalcid Wasp**

INFERENCE

Definition: to derive a conclusion from facts or premises

Synonyms: infer, deduce, deduct, draw, gather, judge

Criteria for Assessing Inferences

Inferences made in intermediate level modules should communicate the process used to derive conclusions. Inferences are valid if they are communicated in a logical sequence with sufficient supporting detail.

Both the type and amount of information used to derive a conclusion are important in determining the validity of the inference.

Each inference made regarding the impact of daily living activities on forest ecosystems should provide:

- ☐ a clear statement of the situation
- ☐ relevant facts and detail that support more than one point of view e.g., cultural, ethical, economic, environmental, health-related
- ☐ a logical sequence of ideas that lead to a conclusion
- ☐ evidence that different points of view were considered in deriving the conclusion
- ☐ a conclusion that is valid and realistic in light of the information gathered.

Log of Reflections and Inferences

The log will include five or more journal entries that describe daily living activities having impact on forest ecosystems. Activities may be seasonal in nature (e.g., burning wood for heat), yet need to be of sufficient duration to permit reflection on their consequences. Each journal entry should describe:

- ☐ the nature of the activity
- ☐ a rationale for participating in the activity
- ☐ inferences regarding both short- and long-term consequences for forest ecosystems.

Journal entries may reference activities that:

- involve the consumption of fibre-based products; e.g.:
 - wood as a fuel
 - paper and paper products
 - food products/additives
- involve recreational use of the forest; e.g.:
 - personal use of forest environments
 - use of recreational vehicles
 - participation in hunting and/or fishing activities
- influence the forest in indirect ways; e.g.:
 - use of heat in the home
 - turning on an electric light
 - use of an automobile.

RATING SCALE

4	3	2	1	0
Exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.	Meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.	Meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.	Meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.	Has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0 N/A
Information Gathering and Processing	4	3	2	1	0 N/A
Content	4	3	2	1	0 N/A
Collaboration and Teamwork	4	3	2	1	0 N/A
Information Sharing	4	3	2	1	0 N/A

STANDARD IS 2 IN EACH APPLICABLE TASK**Rating Scale**

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

G.74/ Forestry, CTS

(1997)

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and establishes steps to achieve them
- ☐ creates and adheres to useful timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively

Information Gathering and Processing

- ☐ accesses a range of relevant in-school/community resources
- ☐ uses a range of information-gathering techniques
- ☐ interprets, organizes and combines information into a logical sequence
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ determines accuracy/currency/reliability of information sources
- ☐ gathers and responds to feedback regarding approach to the task

Content

- ☐ identifies different types of refuse that can be recycled in practical and economical ways
- ☐ identifies four or more products recently developed through recycling techniques; e.g.:
 - plastic wood
 - paper
 - synthetic fibres
 - clothing

Content (continued)

- ☐ identifies advantages and disadvantages associated with each of four recycled products, and trade-offs that occur through the recycling process; e.g.:
 - social
 - economic
 - environmental

- ☐ explains in detail technologies and processes used to develop one or more recycled products, and prepares flowcharts/diagrams that illustrate major stages/steps in the recycling process

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates solutions to problems

Information Sharing

- ☐ demonstrates effective use of two or more communication media:
 - e.g., written, oral, audio-visual*
- ☐ communicates ideas in a logical sequence with sufficient supporting detail
- ☐ maintains acceptable grammatical and technical standards
- ☐ cites five or more relevant information sources

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Analyzing Perspectives	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Evaluating Choices/Making Decisions	4	3	2	1	0

STANDARD IS 2 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ accurately describes an issue related to reducing, reusing and/or recycling on which people disagree, explaining areas of disagreement
- ☐ poses one or more thoughtful questions regarding the issue
- ☐ accesses a range of relevant in-school/community resources
- ☐ uses a range of information-gathering techniques

Analyzing Perspectives

- ☐ identifies and categorizes trade-offs that occur through reducing, reusing and/or recycling e.g., *cultural, ethical, economic, environmental, health-related*

- ☐ states a position on the issue and reasons for adopting that position
- ☐ states two or more opposing positions on the issue and reasons for adopting each position
- ☐ describes interrelationships among different perspectives/points of view
- ☐ determines accuracy/currency/reliability of information and ideas

Collaboration and Teamwork

- ☐ shares work appropriately among group members
- ☐ respects and considers the views of others
- ☐ negotiates solutions to problems

Evaluating Choices/Making Decisions

- ☐ identifies important and appropriate alternatives regarding reducing, reusing and/or recycling
- ☐ establishes knowledge- and value-based criteria for assessing each alternative: e.g., *social, economic, environmental*

- ☐ selects an appropriate alternative by showing differences among choices
- ☐ assesses strengths/weaknesses of decisions made regarding the issue by considering consequences

- ☐ communicates ideas in a logical sequence with sufficient supporting detail to justify choices/decisions made

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Content	4	3	2	1	0
Presenting/Reporting	4	3	2	1	0
	N/A				

STANDARD IS 2 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
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- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST*The student:***Preparation and Planning**

- ☐ sets goals and describes steps to achieve them
- ☐ uses personal initiative to formulate questions and find answers
- ☐ accesses a range of relevant in-school/ community resources
- ☐ interprets, organizes and combines information into a logical sequence
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ plans and uses time effectively
- ☐ gathers and responds to feedback regarding approach to task and project status

Content

- ☐ provides a timeline of major changes that have occurred in the ownership and administration of forested lands in Alberta; e.g.:
- Federal jurisdiction
 - Provincial status
 - *Natural Resources Transfer Act*
- ☐ describes different land tenures in Alberta today; e.g.:
- public (provincial and federal crown lands)
 - private
- ☐ prepares a map that outlines different land management areas in Alberta; e.g.:
- white area
 - green area

Content (continued)

- ☐ explains the mandates of five or more agencies responsible for managing forested lands within Alberta's boundaries; e.g.:
- Alberta Environmental Protection
 - Parks Canada
 - private ownership
 - Metis or Native Indian
 - Forestry Canada
- ☐ prepares a graph (e.g., circle) that depicts current land ownership distribution in Alberta
- ☐
- ☐
- ☐

Presenting/Reporting

- ☐ demonstrates effective use of at least two communication media:
- e.g., Written: *spelling, punctuation, grammar, format (formal/informal)*
- Oral: *voice projection, body language, appearance*
- Audio-Visual: *techniques, tools, clarity*
- ☐ maintains acceptable grammatical and technical standards through proofreading and editing
- ☐ provides an introduction that describes the purpose and scope of the project
- ☐ communicates ideas into a logical sequence with sufficient supporting detail
- ☐ states a conclusion by synthesizing the information gathered
- ☐ provides a reference list that includes five or more relevant information sources

REFLECTIONS/COMMENTS:

DATE	EVENT
1670-1870	Forests are administered by the Hudson Bay Co.
1870	Government of Canada administers forest lands
1885	Disposition of timber is administered by public competition.
	Criteria similar to present LTPs
1905	Alberta becomes a province September 1, 1905, but does not have control of resources
1910	<i>Forest Reserves and Parks Act</i> replaces <i>Forest Reserves Act</i> of 1906
	Five forests are created
1930	Control of natural resources is transferred to Alberta
1948	Crowsnest, Bow and Clearwater forests are placed under AEUB (formerly ERCB) jurisdiction
	Green and Yellow areas are established in Alberta
1949	The Department of Lands and Forests is created
	The first <i>Forests Act</i> is passed
1966	The timber quota system is established.
19--	-----
19--	-----
19--	-----

Reference: *Public Hearings on the Environmental Effects of Forestry Operations in Alberta, Perspectives II - The Forest Industry in Alberta*

FORESTS ACT

This Act provides overall direction for forest legislation (primarily the allocation of timber harvesting rights) in Alberta. It consists of four parts:

1. Administration - defines forest officers, specifies who can make regulations, prescribes uses and prohibited activities.
2. Crown Timber - specifies the four methods of allocating cutting rights to crown timber. Conditions associated with each tenure are outlined.
3. Forest Land Uses - outlines the means to authorize, prescribe and control recreational activities on forested land.
4. Offences and Penalties - outlines offences under the *Forests Act* and prescribes penalties.

Timber Management Regulation

This regulation is more specific than the *Forests Act*. It specifies the conditions associated with Timber Quotas, Commercial Timber Permits (CTPs), Local Timber Permits (LTPs), Forest Products tags, Christmas tree permits, rates of crown dues, timber appraisal, payments of crown charges, clearing land for industrial uses and general provisions. The amounts of specific penalties are also indicated.

Typical content provided in a Forest Management Agreement (FMA) would be:

- description of area
- land withdrawals
- rights over the land
- forest management provisions
 - general
 - reforestation
 - forest protection
- records and scaling
- charges and dues
- mill construction and operation
- deposit
- general provisions.

Forest Land Use and Management Regulations

These regulations control vehicle access into Willmore Wilderness Park and prescribe penalties for the contravention of regulations.

Forest Recreation Regulation

This regulation establishes Forest Land Use Zones, Forest Recreation Areas and Forest Recreation trails. Activities permitted in a Forest Recreation Area are indicted, along with prescribed user fees.

THE FOREST AND PRAIRIE PROTECTION ACT

This Act authorizes legislation that covers all aspects of protecting the forest from fire.

The Forest and Prairie Protection Regulations**Part I**

- issuing of fire permits
- fire prevention precautions (industrial, pipe line, campfires, incinerators, power saws)
- travel in a closed area
- conscription exemptions
- required fire fighting equipment
- liability

Part II

- fire hazard reduction procedures for debris disposal associated with:
 - logging
 - agriculture
 - geophysical exploration
- conduct of firefighting operations
- pollution and erosion control.

FOREST RESERVES ACT

This Act provides a means of establishing forest reserves in Alberta. These reserves are generally south of the 12th Base line and include most of the Foothills South Region. Procedures are indicated for:

- acquiring land
- making regulations
- cancelling permits
- posting signs
- identifying offences and issuing penalties.

Forest Reserves Regulations

These regulations specify the conditions associated with domestic grazing within Forest Reserves, and include:

- types of permits
- requirements of a range management plan
- conditions associated with grazing.

PROVINCIAL PARKS ACT

This Act gives authority to the Government of Alberta to establish criteria for creating provincial parks. It deals with:

- purpose of parks and recreation areas
- authority to acquire land for parks
- authority to create parks and recreation areas
- authority to make regulations for disposition of land for parks
- authority of the Minister regarding closures, concessions, standards of operations and zoning
- control and protection of roads
- authority of parks officers
- seizures
- offences.

WILLMORE WILDERNESS PARK ACT

This Act establishes the Willmore Wilderness area. It identifies intended uses (mines and minerals are not subject to this Act) and gives Cabinet the authority to make regulations.

WILDERNESS AREAS ACT

This Act identifies procedures for establishing a wilderness area. It deals with:

- land acquisition
- programs permitted in a wilderness area
- prohibited activities
- travel restrictions
- provision of adjacent buffer areas
- offences and penalties.

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0 N/A
Information Gathering and Processing	4	3	2	1	0 N/A
Content	4	3	2	1	0 N/A
Collaboration and Teamwork	4	3	2	1	0 N/A
Information Sharing	4	3	2	1	0 N/A

STANDARD IS 2 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

G.80/ Forestry, CTS
(1997)

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and establishes steps to achieve them
- ☐ creates and adheres to useful timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively

Information Gathering and Processing

- ☐ accesses a range of relevant in-school/community resources
- ☐ uses a range of information-gathering techniques
- ☐ interprets, organizes and combines information into a logical sequence
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ determines accuracy/currency/reliability of information sources
- ☐ gathers and responds to feedback regarding approach to the task

Content

- ☐ explains the use of dispositions/authorizations in the form of permits, licences and other legal agreements in managing commercial activities on forested lands
- ☐ identifies different public land users/uses, and criteria for establishing forest land and timber dispositions; e.g.:
 - fibre production
 - recreation/agriculture
 - wildlife habitat

Content (continued)

- ☐ describes the intent of three or more different timber dispositions issued by the Alberta Forest Service, and the responsibilities of holders of these dispositions
- ☐ describes the intent of three or more other types of dispositions used to manage nonfibre aspects of forest use; e.g.:
 - grazing
 - hunting, fishing and trapping
 - energy and mineral development
- ☐ explains the role of consultation (with other resource users) and public involvement in establishing land and timber dispositions

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates solutions to problems

Information Sharing

- ☐ demonstrates effective use of two or more communication media:
 - e.g., written, oral, audio-visual
- ☐ communicates ideas in a logical sequence with sufficient supporting detail
- ☐ maintains acceptable grammatical and technical standards
- ☐ cites five or more relevant information sources

REFLECTIONS/COMMENTS:

TRIP PLANNING AND PREPARATION	TRIP PLANNING AND PREPARATION (continued)	CONDUCTING THE TRIP
<p><i>The student:</i></p> <p>☐ establishes specific objectives for an outdoor wilderness trip; e.g.:</p> <ul style="list-style-type: none"> ☐ goals and expectations ☐ length of trip ☐ destination ☐ general itinerary and daily agendas <p>☐ prepares a camping menu for self that addresses:</p> <ul style="list-style-type: none"> ☐ expected caloric output ☐ all food groups included in the <i>Canada's Food Guide for Healthy Eating</i> ☐ concerns related to food spoilage ☐ provisions for emergency <p>☐ plans for weather and seasonal conditions; e.g.:</p> <ul style="list-style-type: none"> ☐ identifies hazards particular to the area ☐ listens to weather and news reports/forecasts <p>☐ incorporates guidelines for environmental awareness into trip planning; e.g.:</p> <ul style="list-style-type: none"> ☐ principles of ecotourism ☐ consideration for carrying capacity ☐ strategies for minimum impact land use <p>☐ identifies and obtains appropriate supplies, equipment and personal gear for the trip; e.g.:</p> <ul style="list-style-type: none"> ☐ water and food ☐ tent, stove, axe ☐ first aid and survival supplies ☐ clothing and foot wear ☐ toiletries 	<p><i>The student:</i></p> <p>☐ conducts pre-trip assessment of supplies, equipment and personal gear; e.g.:</p> <ul style="list-style-type: none"> ☐ compares to trip checklist ☐ assesses quality, quantity and condition ☐ assesses weather and seasonal conditions ☐ obtains missing and/or specialty items <p>☐ prepares supplies, equipment and personal gear for transportation; e.g.:</p> <ul style="list-style-type: none"> ☐ addresses weight restrictions ☐ makes efficient use of space ☐ packs food to prevent spoilage and minimize odour <p>☐ plans course of action to cope with potential emergency situations in the wilderness; e.g.:</p> <ul style="list-style-type: none"> ☐ extreme weather conditions ☐ fire or flood ☐ injury and illness ☐ avalanche <p>☐ reviews legislation and policy requirements relevant to area being visited; e.g.:</p> <ul style="list-style-type: none"> ☐ information regarding dangers inherent in the area ☐ permits/licences that may be required <p>☐</p> <p>☐</p>	<p><i>The student:</i></p> <p>☐ follows guidelines for safe travel in an outdoor environment; e.g.:</p> <ul style="list-style-type: none"> ☐ follows travel schedule as planned ☐ uses orientation and navigational skills ☐ identifies potential hazards and takes necessary precautions ☐ dresses according to mode of travel, weather and season ☐ watches for changes in current weather conditions <p>☐ sets up campsite following guidelines for comfort, safety and least possible environmental impact; e.g.:</p> <ul style="list-style-type: none"> ☐ selects appropriate campsite ☐ erects tent or lean-to ☐ assembles other amenities ☐ protects food from wildlife and spoilage ☐ protects equipment from the elements <p>☐ follows minimal impact guidelines in establishing and using campsite; e.g.:</p> <ul style="list-style-type: none"> ☐ latrine location and toilet procedures ☐ wash area and procedures ☐ fire site and use ☐ garbage and waste water disposal <p>☐ complies with local, provincial and federal legislation relevant to activities that are undertaken</p> <p>☐ assumes camp duties on a rotational basis; e.g.:</p> <ul style="list-style-type: none"> ☐ meal preparation ☐ camp maintenance and hygiene

CONDUCTING THE TRIP (continued)	
<i>The student:</i>	
☐ monitors the activities of wildlife in the area and takes precautions to avoid dangerous situations	
☐	
☐	

WILDERNESS INTERACTION	
<i>The student:</i>	
☐ identifies 25 insect, bird, mammal and/or other animal species	
☐ identifies 25 tree, shrub and/or other plant species	
☐ identifies, while demonstrating appropriate safety/health precautions, five different: <ul style="list-style-type: none"> ☐ animal tracks and scat ☐ hazardous plants 	
☐ identifies five or more uses of plants and/or animals for human survival and comfort in the wilderness environment	
☐ spends three hours alone in a designated wilderness area, and shares experiences and coping strategies	

WILDERNESS INTERACTION (continued)	
<i>The student:</i>	
☐	
☐	

BREAKING CAMP AND CONCLUDING THE TRIP	
<i>The student:</i>	
☐ follows appropriate procedures for breaking camp: <ul style="list-style-type: none"> ☐ packs supplies, equipment and personal gear ☐ takes down shelter ☐ cleans site and removes waste ☐ does circle tour of site 	
☐ conducts a post-trip assessment: <ul style="list-style-type: none"> ☐ observations and personal impressions ☐ activities well done ☐ problems encountered ☐ recommendations regarding future trips 	
☐	
☐	

STANDARD IS 2 IN EACH APPLICABLE TASK AREA

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
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- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.
- N/A Not applicable

REFLECTIONS/COMMENTS

TASK	OBSERVATION/RATING				
Individual/Group Preparedness	4	3	2	1	0 N/A
Cooperation and Teamwork	4	3	2	1	0 N/A
Responsibility and Safety	4	3	2	1	0 N/A
Environmental Ethics	4	3	2	1	0 N/A

STANDARD IS 2 IN EACH APPLICABLE TASK

Rating Scale

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- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
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 - 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.
- N/A Not applicable

TASK CHECKLIST <i>The student:</i>	
Individual/Group Preparedness ☐ sets goals and follows instructions accurately ☐ adheres to established timelines ☐ identifies/assembles outdoor gear appropriate to the task ☐ uses time effectively ☐ identifies tasks well done ☐ identifies problems encountered and suggests solutions ☐ makes recommendations regarding future trips ☐ ☐	Responsibility and Safety ☐ selects and uses appropriate equipment/materials ☐ follows safe procedures/techniques ☐ anticipates and advises of potential hazards ☐ practises proper sanitation procedures ☐ identifies tasks well done ☐ identifies problems encountered and suggests solutions ☐ makes recommendations regarding future trips ☐ ☐
Cooperation and Teamwork ☐ works with a range of peer members ☐ shares work appropriately among group members ☐ considers the ideas/suggestions of others ☐ identifies tasks well done ☐ identifies problems encountered and suggests solutions ☐ makes recommendations regarding future trips ☐ ☐	Environmental Ethics ☐ uses environmentally friendly materials ☐ picks up garbage and carries out everything that is carried in ☐ avoids ecologically sensitive areas ☐ demonstrates techniques for protecting water supply ☐ identifies tasks well done ☐ identifies problems encountered and suggests solutions ☐ makes recommendations regarding future trips ☐ ☐

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Information Gathering and Processing	4	3	2	1	0
Content	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Information Sharing	4	3	2	1	0

STANDARD IS 2 IN EACH APPLICABLE TASK**Rating Scale**

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N/A Not Applicable

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and establishes steps to achieve them
- ☐ creates and adheres to useful timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively

Information Gathering and Processing

- ☐ accesses a range of relevant in-school/community resources
- ☐ uses a range of information-gathering techniques

- ☐ interprets, organizes and combines information into a logical sequence
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ determines accuracy/currency/reliability of information sources
- ☐ gathers and responds to feedback regarding approach to the task

Content

- ☐ distinguishes between random and systematic sampling techniques
- ☐ defines/illustrates and explains the steps involved in conducting:
 - random plot samples
 - random transect samples
 - systematic plot samples
 - systematic transect samples

Content (continued)

- ☐ identifies sampling designs suited to gathering specific data regarding:
 - distribution of a tree species
 - growth, age and/or volume of trees
 - soil, water and/or wildlife characteristics
 - potential for recreation and/or agriculture
- ☐ explains sources of bias and error in random and systematic sampling designs, and problems related to use of the sample data in estimating forest values or populations

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates solutions to problems

Information Sharing

- ☐ demonstrates effective use of two or more communication media:
 - e.g., written, oral, audio-visual*
- ☐ communicates ideas in a logical sequence with sufficient supporting detail
- ☐ maintains acceptable grammatical and technical standards
- ☐ cites five or more relevant information sources

REFLECTIONS/COMMENTS:

ALLOCATING TIME AND MATERIALS	
<i>The student:</i>	develops and follows a schedule of activities for sampling forest values
☐	
☐	selects and safely uses appropriate equipment and materials
☐	uses appropriate safety devices; e.g.: ☐ protective clothing ☐ protective eye wear ☐ hard hats
☐	recognizes potential hazards and takes steps to eliminate/avoid them.

SAMPLING DESIGN	
<i>The student:</i>	identifies goals/outcomes for a forest survey
☐	
☐	determines the type and amount of data to be collected
☐	selects a sampling technique suited to survey goals/outcomes and type/amount of data to be collected; e.g.: ☐ random ☐ systematic ☐ transect ☐ plot
☐	establishes boundaries for the sample area
☐	designs a data collection sheet appropriate to the information to be collected
☐	takes necessary precautions to address health and safety concerns throughout the planning process (e.g., huanata virus in owl pellets)

COLLECTING, RECORDING AND COMPILING SAMPLE DATA	
<i>The student:</i>	collects sample data regarding a specific fibre and nonfibre value on 0.01% of the forested area
☐	
☐	records data accurately and systematically, using standard data collection techniques
☐	adheres to health and safety practices while collecting and recording data
☐	performs calculations on sample data as required in order to estimate fibre and nonfibre resources
☐	prepares a summary of fibre data accurate to within 10% of existing volume estimates
☐	states conclusions regarding fibre and nonfibre values based on observations and compilations of sample data.
☐	
☐	

SUMMARIZING AND ASSESSING SURVEY RESULTS	
<i>The student:</i>	summarizes the strengths and weaknesses of the sample data
☐	
☐	considers limitations and generalizability of conclusions drawn regarding fibre and nonfibre values in the forested area
☐	critically examines procedures/outcomes/ task performance and suggests refinements.

SUMMARIZING AND ASSESSING SURVEY RESULTS (continued)	
<i>The student:</i>	
☐	
☐	

STANDARD IS 2 IN EACH APPLICABLE TASK

Rating Scale

The student:

4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.

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1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.

0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

REFLECTIONS/COMMENTS

ACTIVITY #1

TREE HEIGHT/DIAMETER

Measure and record the total height and diameter at breast height for all trees in the plot marked out by flagging tape.

[illegible]

ACTIVITY #2

TREE HEIGHT

Determine the height of four flagged trees.

Tree #	Height (Metres)
1	
2	
3	
4	

ACTIVITY #3

TREE AGE

Use an increment borer to find the age, at breast height, of four marked trees.

Tree #	Age	# of Rings in Last 2.5 cm	Last Years Growth Included (Yes or No)
1			
2			
3			
4			

ACTIVITY #4

SAMPLE VOLUME CALCULATION

Use volume tables to determine the volume/ha for each species. Then calculate the total volume/ha. Data is collected from a 10 m x 10 m plot.

SPRUCE			ASPEN	
Diameter (cm)	Height (cm)		Diameter (cm)	Height (cm)
12	12		12	14
32	18		22	18
26	17		22	18
18	13		30	21
22	16		18	18
40	24			
52	24			
62	28			
16	14			
14	13			
16	13			
20	16			

Volume (Spruce) = _____

Volume (Aspen) = _____

TOTAL VOLUME/HA =

ACTIVITY #5

SAMPLE WILDLIFE INVENTORY FORM

Signs of Browning # _____ Evidence (# species) _____

Signs of scat # _____ Distance of nearest water _____m

Distance to nearest permanent housing _____km

Availability of forage: low medium high

Type: _____

Availability of browse species: low medium high

Type: _____

Other signs of wildlife (e.g., nests, burrows): _____

ACTIVITY #6

SAMPLE INSECT AND DISEASE INVENTORY FORM

Evidence of insects: low medium high

Evidence of disease: low medium high

Specimen 1:
Attack location

roots	yes	no
trunk	yes	no
foliage	yes	no

Specimen 2:
Attack location

roots	yes	no
trunk	yes	no
foliage	yes	no

Specimen 3:
Attack location

roots	yes	no
trunk	yes	no
foliage	yes	no

Assessment Criteria and Conditions:

- identifying major components of a plan for forest harvest, including:
 - when and how much to cut
 - methods of harvest (e.g., clearcutting, shelter wood method) and logging (e.g., hand, mechanical)
 - regeneration and environmental protection.

Suggested Reference(s):

- *Alberta's Focus on Forests*
- *Our Growing Resource*
- *Managing the Forest*

STANDARD: Respond to a standard of 2 on the rating scale.

Rating Scale

The student:

- 4 meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
 - 3 meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
 - 2 meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
 - 1 completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
 - 0 does not complete the task, or is unable to provide a suitable response.
- N/A Not Applicable

Background Information	Sample Questions / Activities
<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> • Activity 4.6: Cutting Styles • Activity 5.3: Forest Perspectives. <p>See <i>Managing the Forest</i>:</p> <p><u>Harvest</u></p> <ul style="list-style-type: none"> • Logging Plans • Forest roads • Harvesting Methods • Hazard Abatement - Slash Burning. 	<p>1. Define and give examples of allowable cut, sustained yield and integrated use within the context of forest harvest planning.</p> <p>2. Explain applications of forest inventory data in establishing a plan for harvest; e.g.:</p> <ul style="list-style-type: none"> – identification of tree species – determining timber quality, volume and age – layout of cutting area and landing sites – planning for forest access <p>3. Explain and illustrate the clear cutting, seed tree, shelter wood and selection methods of forest harvest.</p> <p>4. Give examples of natural and artificial regeneration, and the advantages/disadvantages of each.</p> <p>5. Identify environmental concerns to be addressed through harvest planning; e.g.:</p> <ul style="list-style-type: none"> – protection of sensitive areas – impact on downstream values – landslide and erosion hazards.

PLANNING COMPONENTS	YES	NO	N/A
Have block layout requirements been met?	☐	☐	
Has block size met operating ground rule guidelines?	☐	☐	
Have operability factors been considered?	☐	☐	
Has the condition of the timber been accounted for?	☐	☐	
Have deciduous and coniferous operations been integrated?	☐	☐	☐
Have utilization standards been considered?	☐	☐	
Is the method of harvest appropriate to the terrain?	☐	☐	
Do block boundaries follow natural breaks in topography, stand types, watershed divides, etc.?	☐	☐	
Is harvest sequence logical in volume to be removed at any cut, timing of the second cut, etc.?	☐	☐	
Have management objectives of other agencies been considered? <ul style="list-style-type: none"> • fisheries and wildlife • recreation • watershed 	☐	☐	☐
Is the reforestation plan included?	☐	☐	
Is a plan for forest protection included?	☐	☐	
Have forest landscape management principles been applied?	☐	☐	

STANDARD IS 2 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
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- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

REFLECTIONS/COMMENTS

CLEARCUTTING

1. Give a definition of clearcutting.
 - *A method of reproducing even aged stands where all of the standing mature trees are cut at one time during a rotation.*
2. Give four examples of situations or conditions where clearcutting is the only feasible reproduction method to use.
 - *even aged, mature to over mature stands*
 - *shade intolerant species*
 - *on sites subject to windthrow*
 - *stand replacement, e.g.:*
 - *good phenotypes to replace poor phenotypes*
 - *change species composition*
 - *change to a regulated forest.*
3. Identify three advantages of using artificial regeneration with clearcutting.
 - *equipment and techniques in logging and site preparation are unrestricted*
 - *close control of composition and arrangement of new stand*
 - *superior genetic strains and species can be introduced*
 - *prompt regeneration.*
4. What are two disadvantages of using artificial regeneration with clearcutting?
 - *slash disposal is required*
 - *existing vegetation must be controlled before planting*
 - *may be a tendency toward a monoculture.*
5. Identify three conditions where it is advantageous to use artificial regeneration with clearcutting.
 - *where seed supply is not dependable*
 - *where it is desirable to change species composition*
 - *dense, mature forests where dominants are not windfirm*
 - *where silvicultural practice is intensive.*
6. What two conditions are essential if natural regeneration is to be used successfully with clearcutting?
 - *distribution of abundant seed supply over entire area*
 - *favourable environmental conditions for seed germination and development.*
7. What are two problems with relying on natural regeneration after clearcutting in a white spruce stand?
 - *delay in regeneration until there is a good seed crop and weather suitable for germination and survival*
 - *the delay in regeneration may result in development of ground vegetation which leads to an irregular aged stand.*

8. Identify the three modifications of the clearcutting method.
 - *patch*
 - *alternate strip*
 - *progressive strip.*
9. What is the minimum number of cutting operations in the progressive strip method?
 - *three.*
10. What are three biological advantages of the clearcutting method?
 - *appropriate for shade intolerant species*
 - *can change species composition*
 - *thorough site preparation include seed from standing timber, slash-borne cones and artificial regeneration*
 - *the only method to obtain successful regeneration from some species.*
11. List three considerations that come into play when planning size, form and arrangement of cuts for a clearcutting operation.
 - *ecological characteristics of the species*
 - *topography*
 - *road network*
 - *logging equipment.*
12. What are three advantages of progressive strip clearcutting over other forms of clearcutting?
 - *area to be artificially regenerated is smaller than with other methods*
 - *strip widths can be made narrow enough so natural regeneration takes place*
 - *reduction in potential losses from windthrow (the last strip is the most susceptible)*
 - *aesthetics are improved over other methods since volume harvested at any time is low.*
13. Identify two economic advantages of the clearcutting method.
 - *harvesting costs are low*
 - *simple and efficient administration, logging and silvicultural operations.*
14. What are three biological disadvantages of the clearcutting method?
 - *maximum degree of site exposure*
 - *slash hazard*
 - *require site preparation*
 - *all parts of a stand pass simultaneously through each stage of development.*

CLEARCUTTING (continued)

15. What are two economic disadvantages of the clearcutting method?
 - *cost of regeneration may be high*
 - *may not be a market for small sized wood*
 - *must wait one full rotation until the next harvest.*
16. What are three detrimental effects on fish populations when clearcutting right to the edge of stream banks?
 - *water temperatures rise adversely affecting the food supply of fish*
 - *situation of streams*
 - *debris can clog streams.*
17. Give three specific situations where clearcutting is the most appropriate method of cutting.
 - *where there are even aged over mature forests*
 - *where there are shade intolerant species*
 - *where sites are subject to windthrow*
 - *where poor phenotypes are to be replaced by good phenotypes or where species composition is to be changed.*
18. Clearcutting results in maximum site exposure. Identify three environmental factors associated with this exposure and indicate how each of these affects the chances for regeneration of tree seedlings.
 - *high radiation loads during day – heat injury*
 - *large diurnal temperature fluctuations – danger of freezing injury*
 - *high moisture stress – seedling desiccation*
 - *erosion of soil – seedlings washed out or buried*
 - *more wind – high evaporative stress.*

19. Give three reasons why harvesting costs are lower in clearcutting than with any other reproduction method.
 - *operations are concentrated*
 - *minimal road development*
 - *few restrictions on equipment*
 - *no tree marking.*

SEED TREE METHOD

20. Define what is meant by the seed tree reproduction method.
 - *A method to propagate even aged stands where essentially all mature trees are removed at one time with the retention of scattered trees (singly or in small groups) to serve as a seed source.*
21. In what two ways does the seed tree method differ from clearcutting?
 - *retention of scattered seed trees*
 - *seed supply from the scattered seed trees – more uniform seed distribution.*

22. Identify two situation or conditions where the seed tree method is appropriate.
 - *even aged stands*
 - *shade intolerant, windfirm trees with light, wind blown seed*
 - *where there are few restrictions on size and arrangement of cut areas.*
23. Identify four desirable characteristics for seed trees.
 - *must be windfirm*
 - *must produce abundant and fertile seed*
 - *must be a dominant (D) or a good codominant (CD)*
 - *good phenotype*
 - *desired species.*
24. What are two silvical advantages of the seed tree method over the clearcutting method?
 - *source of seed on very ha*
 - *good control of species composition and phenotypic characteristics.*
25. What are three economic advantages of the seed tree method over the clearcutting method?
 - *larger areas can be cut at one time*
 - *simple to apply since the only marking required is the seed trees*
 - *seed trees may be cut or left.*
26. Identify two disadvantages (economic or biological) of the seed tree method compared to the clearcutting method.
 - *seed source is exposed and there is risk of loss*
 - *some restrictions in logging.*
27. Why is the seed tree method not very commonly used now?
 - *The method was not properly applied (e.g., too few seed trees per ha left, trees lacked windfirmness, poor quality trees were left).*
28. Is the seed tree method desirable for the White Spruce and Lodgepole Pine species in Alberta? For each species answer yes or no and indicate why.

White Spruce	Lodgepole Pine
– <i>no, lacks windfirmness</i>	– <i>no, not ideal for serotinous coned populations, may be suitable for populations with nonserotinous cones.</i>

SHELTERWOOD METHOD

- 29 Give a definition of the shelterwood reproduction method. Be sure to indicate how the method differs from other reproduction methods.
- *This is a method to propagate even aged stands where two or more partial cuts are made in a mature stand over a relatively short period (<20%) of the rotation.*
30. The preparatory cutting is the first cut in a three-cut shelterwood. What are the two purposes for undertaking this cut?
- *open up the stand to enhance seed production*
 - *allow more radiation to reach the forest floor and decompose thick organic horizons.*
31. What crown classes are removed in a preparatory cutting?
- *intermediate (I), overtopped or suppressed (O), poorly formed codominant (CD).*
32. What is the purpose of the seed cutting?
- *To further open up the stand and allow for establishment of regeneration.*
33. When should the seed cutting in the shelterwood method occur?
- *During a good seed year.*
34. What are two purposes for the removal cuttings in the shelterwood method?
- *uncover the new crop*
 - *to remove overstorey which has increased in value.*
35. What is the prime factor that will determine when a removal cut (final cut) should be made?)
- *Condition of the regeneration, when regeneration is well established the final cut can be made.*
36. Identify four biological advantages of the shelterwood method.
- *best seed supply of even aged systems*
 - *natural regeneration is more certain and complete*
 - *best method for producing even aged stands of shade tolerant species*
 - *light and heavy seeded species can be regenerated*
 - *suitable for stands consisting of two or more species with different lengths of rotation*
 - *reduced fire hazard*
 - *less susceptible to insects and diseases.*
37. What are two biological disadvantages of the shelterwood method?
- *risk of windfall*
 - *damage to regeneration during harvest*
 - *damage to overstorey during harvest.*

38. The shelterwood method has a number of economic advantages. Identify two of them.
- *less waste than clearcutting*
 - *overlap of rotations*
 - *for sawlog material or high value product.*
39. What is one economic disadvantage of the shelterwood method?
- *harvesting is costly*
 - *high cost of harvesting may be essential to obtain cheap natural regeneration.*
40. What is the purpose of the seed cutting in the shelterwood method? What three crown classes are removed in this cut?
- *Open up stand so regeneration can become established*
 - *intermediate (I), overtopped or suppressed (O), many codominant (CD).*
41. Give three reasons why harvesting is more expensive with the shelterwood method than with clearcutting.
- *more restrictions on logging equipment*
 - *tree marking is required*
 - *more skilled personnel required*
 - *more scattered operations*
 - *same area logged more than once.*
42. Give two economic features (other than harvesting) which apply to the shelterwood method.
- *overlap or rotations*
 - *cheap natural regeneration may be obtained.*
43. Identify five biological features of the shelterwood method.
- *best seed supply of even aged systems*
 - *natural regeneration more certain and complete*
 - *best method for producing even aged stands of shade tolerant species*
 - *can regenerate light and heavy seeded species*
 - *suitable for stands consisting of two or more species with different lengths of rotation*
 - *lowered susceptibility to insects and disease*
 - *fire hazard may be reduced*
 - *risk of windfall*
 - *damage to regeneration during harvest*
 - *damage to overstorey during harvest.*

SELECTION METHOD

44. Give a definition of the selection reproduction method.
 - *Mature timber in an uneven aged stand is removed as single, scattered trees or in small groups, at short intervals (cutting cycles) repeated indefinitely.*
45. identify three situations where the selection method would be appropriate to use.
 - *all aged or uneven aged stands*
 - *high value stands of sawtimber*
 - *areas of high danger for windfall and snow breakage*
 - *protection forests*
 - *parks where aesthetics are important.*
46. What is meant by the cutting cycle in the selection method?
 - *The number of years between successive cuts in the same stand.*
47. The selection method can be used in stands which have a J-shaped dbh class distribution. What is meant by a J-Shaped curve?
 - *This is a diameter distribution curve in a stand that has a large number of small diameter trees and a small number of large diameter trees.*
48. What is the minimum number of age classes in a stand suitable for the selection method?
 - *three.*
49. Why is it important to maintain a balance between the following components?
 - A) growth
 - B) harvested yield
 - C) reproduction.
 - *If any component is reduced too severely, eventually the stand will have insufficient regeneration and sustained yield cannot be attained.*
50. Identify three characteristics that you might use in selecting trees to be harvested.
 - *trees larger than a specified dbh*
 - *age or size of trees*
 - *quality of trees*
 - *vigour of trees.*
51. Identify two economic advantages of the selection method.
 - *production and financial returns are continuous*
 - *financially attractive for farm woodlots*
 - *merchantable yield may be higher than with even aged methods.*

52. Identify five advantages of the selection reproduction method. Consider only the silvics of the tree species or stands.
 - *maximum site protection*
 - *continuous seed source*
 - *sell protected seedlings*
 - *reduced windfall hazard*
 - *minimized snow damage*
 - *minimized insect and disease damage*
 - *only method to maintain uneven aged stands*
 - *applicable to shade tolerant species*
 - *thin and harvest cut simultaneously*
 - *minimized fire hazard.*
53. What are two other advantages (exclude economics and silvics) of the selection method?
 - *enhanced aesthetics*
 - *improved wildlife habitat*
 - *fish habitat optimized.*
54. Give three reasons why harvesting costs with the selection method are higher than for any other reproduction method.
 - *operations are scattered*
 - *restrictions on choice of logging methods and equipment*
 - *each area must be logged a number of times*
 - *skilled personnel are needed for marking, felling and extraction.*
55. Indicate two other economic disadvantages of the selection method.
 - *restricted to situations where there is a market for large size, high value trees*
 - *danger of high grading*
 - *no debris in stream to clog channel*
 - *complicated administration.*
 - *danger of high grading*
 - *complicated administration.*
56. What is one advantage for stream fish when the selection method of harvesting is used?
 - *streams are shaded to water temperature does not rise*
 - *no debris in stream to clog channel*
 - *bank damage is minimized so siltation is reduced.*
57. Identify two advantages for deer when the selection method of timber harvest is used.
 - *edge effect is maximized*
 - *feeding areas (open) in proximity to hiding and thermal cover.*

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Information Gathering and Processing	4	3	2	1	0
Content	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Information Sharing	4	3	2	1	0

STANDARD IS 2 IN EACH APPLICABLE TASK**Rating Scale**

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

G.94/ Forestry, CTS

(1997)

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets goals and establishes steps to achieve them
- ☐ creates and adheres to useful timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively

Information Gathering and Processing

- ☐ accesses a range of relevant in-school/community resources
- ☐ uses a range of information-gathering techniques
- ☐ interprets, organizes and combines information into a logical sequence
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ determines accuracy/currency/reliability of information sources
- ☐ gathers and responds to feedback regarding approach to the task

Content

- ☐ outlines major categories/types of forest products, and examples of consumer products within each category; e.g.:
 - pulp and paper
 - lumber
 - veneer and plywood
 - board products
 - chemical and medicinal products

Content (continued)

- ☐ explains the steps and processes involved in converting a log into:
 - lumber
 - pulp
 - one other forest product
- ☐ provides a summary of new developments in milling and pulping technology
- ☐ provides a list of safety regulations pertinent to a sawmill and/or a pulp mill

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates solutions to problems

Information Sharing

- ☐ demonstrates effective use of two or more communication media:
 - e.g., written, oral, audio-visual*
- ☐ communicates ideas in a logical sequence with sufficient supporting detail
- ☐ maintains acceptable grammatical and technical standards
- ☐ cites five or more relevant information sources

REFLECTIONS/COMMENTS:

Assessment Criteria and Conditions:

- developing a rationale for forest management in Alberta that involves:
 - identifying economic, environmental and social needs addressed through forest management
 - definitions and examples of sustainable development, sustained yield and allowable cut

Suggested Reference(s):

- *Our Growing Resource*
- *Alberta's Focus on Forests*
- *Managing the Forest*

STANDARD: Respond to a standard of 2 on the rating scale.

Rating Scale

The student:

- 4 meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
 - 3 meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
 - 2 meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
 - 1 completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
 - 0 does not complete the task, or is unable to provide a suitable response.
- N/A Not Applicable

Background Information	Sample Questions/Activities
<p>See <i>Our Growing Resource</i>, Chapter 2 – The Challenge of Sustainable Development:</p> <ul style="list-style-type: none"> • Managing Forest Development • Integrated Resource Management – Accommodating Many Uses • Harvest Planning and Practices • Reforestation • Air and Water Quality • Building Sustainable Businesses. <p>See <i>Alberta's Focus on Forests</i>, Unit 5 – Forest Management for All:</p> <ul style="list-style-type: none"> • 5.1: Forest Values • 5.2: Decision for Change • 5.3: Forest Perspectives • 5.4: Reforestation: Forests or Tree Farms? • 5.5: Integrated Resource Management • 5.6: What's in the Wastebasket – Reassessing Our Needs 	<ol style="list-style-type: none"> 1. Explain the goals of “sustainable development,” “sustainable yield” and “allowable cut” within the context of Alberta’s forests. 2. Discuss the meaning of the following definition of sustainable forest management: “the development of forests to meet current needs without prejudice to their future productivity, ecological diversity, or capacity for regeneration.” 3. Identify and explain major components/ considerations in sustainable forest management; e.g.: <ul style="list-style-type: none"> – timber resources – biodiversity of wildlife – air, land and water quality. 4. Identify two or more economic, environmental and social needs addressed through the management of forested lands in Alberta. 5. Interview representatives of three or more different forest industry organizations regarding their approach to sustainable forest management; e.g.: <ul style="list-style-type: none"> – priorities – actions. 6. Identify current research projects underway that are intended to support sustainable forestry practices.

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Analyzing Perspectives	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Evaluating Choices/Making Decisions	4	3	2	1	0

STANDARD IS 2 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST

The student:

Preparation and Planning

- ☐ accurately describes ten or more current uses/values of Alberta's forests
- ☐ poses thoughtful questions regarding each forest use/value
- ☐ accesses a range of relevant information sources and recognizes when additional information is required
- ☐ demonstrates resourcefulness in collecting data

Analyzing Perspectives

- ☐ categorizes the views of different interest groups regarding three or more types of forest use; *e.g., cultural, ethical, economic, environmental, health-related, scientific, political*
- ☐ states a position on one issue regarding forest use, and insightful reasons for adopting that position
- ☐ states two or more opposing positions on the issue and thoughtful reasons for adopting each position
- ☐ analyzes interrelationships among different perspectives/points of view
- ☐ recognizes underlying bias/assumptions/values in information and ideas

Collaboration and Teamwork

- ☐ shares work appropriately among group members
- ☐ respects and considers the views of others
- ☐ negotiates with sensitivity solutions to problems regarding forest use

Evaluating Choices/Making Decisions

- ☐ describes in detail important and appropriate alternatives regarding one type of forest use
- ☐ establishes knowledge- and value-based criteria for assessing each alternative; *e.g., social, economic, environmental*
- ☐ selects an appropriate and useful alternative by showing differences among choices
- ☐ assesses strengths/weaknesses of decisions by considering consequences and implications for:
 - forest users
 - forest ecosystems
- ☐ develops strategies for compromise and/or conflict resolution among different forest users/interest groups
- ☐ communicates thoughts/feelings/ideas clearly to justify choices/decisions made

REFLECTIONS/COMMENTS:

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Information Gathering and Processing	4	3	2	1	0
Content	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Information Sharing	4	3	2	1	0

STANDARD IS 2 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

Assessment Tools

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TASK CHECKLIST*The student:***Preparation and Planning**

- ☐ sets goals and establishes steps to achieve them
- ☐ creates and adheres to useful timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively

Information Gathering and Processing

- ☐ accesses a range of relevant in-school/community resources
- ☐ uses a range of information-gathering techniques
- ☐ interprets, organizes and combines information into a logical sequence
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ determines accuracy/currency/reliability of information sources

- ☐ gathers and responds to feedback regarding approach to the task

Content

- ☐ defines and gives examples of conservation and preservation within the context of forest management
- ☐ cites instances where differences in philosophy have affected forest management and protection
- ☐ explains the mandates of five or more agencies responsible for managing Alberta's forested lands; e.g.:
- Alberta Forest Service
 - Fish and Wildlife Services

Content (continued)

- ☐ explains the intent of four or more different agreements, permits and/or licences that make Alberta's forests available for commercial or private use; e.g.:
- forest management agreements
 - quota certificates
 - commercial/private timber permits
- ☐ identifies factors likely to influence future forest management practices; e.g.:
- knowledge/technology
 - recreation and tourism

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates solutions to problems

Information Sharing

- ☐ demonstrates effective use of two or more communication media: e.g., *written, oral, audio-visual*
- ☐ communicates ideas in a logical sequence with sufficient supporting detail
- ☐ maintains acceptable grammatical and technical standards
- ☐ cites five or more relevant information sources

REFLECTIONS/COMMENTS:

Assessment Criteria and Conditions:

- identifying four or more major categories of forest use (e.g., industry, recreation, tourism, environmental) and examples of forest users within each category

Suggested Reference(s):

- *Alberta's Focus on Forests*
- *Woodlot Management Guide for the Prairie Provinces*

STANDARD: Respond to a standard of 2 on the rating scale.

Rating Scale

The student:

- 4 meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
 - 3 meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
 - 2 meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
 - 1 completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
 - 0 does not complete the task, or is unable to provide a suitable response
- N/A Not Applicable

Background Information	Sample Questions/Activities
<p>See <i>Alberta's Focus on Forests</i>, Unit 5 - Forest Management for All:</p> <ul style="list-style-type: none"> • 5.1: Forest Values • 5.2: Decision for Change • 5.3: Forest Perspectives • 5.4: Reforestation: Forests or Tree Farms? • 5.5: Integrated Resource Management • 5.6: What's in the Wastebasket - Reassessing Our Needs <p>See <i>Woodlot Management Guide for the Prairie Provinces</i>:</p> <ul style="list-style-type: none"> • Section G: Wildlife and Woodlots • Section H: Recreation • Section J: Agroforestry 	<ol style="list-style-type: none"> 1. Identify major categories of forest use and different forest users within each category; e.g.: <ul style="list-style-type: none"> – industrial – recreational – tourism – agriculture – environmental 2. Describe a range of specific forest uses and multiple demands placed upon forested lands; e.g.: <ul style="list-style-type: none"> – wood fibre production – wildlife management – grazing and range management – watershed – oil, gas and mining – recreation – protected areas 3. Explain why forests can and should serve many purposes. 4. Cite examples of the multiple use of Alberta's forests; e.g.: <ul style="list-style-type: none"> – using different parts of the forest for different purposes – using the same area of the forest to obtain more than one benefit. 5. Interview representatives of three or more different forest industry organizations regarding their approach to multiple use of forested lands; e.g.: <ul style="list-style-type: none"> – priorities – actions.

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Information Gathering and Processing	4	3	2	1	0
Content	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Information Sharing	4	3	2	1	0

STANDARD IS 2 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

Assessment Tools

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TASK CHECKLIST*The student:***Preparation and Planning**

- ☐ sets goals and establishes steps to achieve them
- ☐ creates and adheres to useful timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively

Information Gathering and Processing

- ☐ accesses a range of relevant in-school/community resources
- ☐ uses a range of information-gathering techniques
- ☐ interprets, organizes and combines information into a logical sequence
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ determines accuracy/currency/reliability of information sources
- ☐ gathers and responds to feedback regarding approach to the task

Content

- ☐ explains why forests can and should simultaneously serve social, economic and environmental goals
- ☐ provides a definition of multiple land use, and cites examples of the multiple use of Alberta's forests; e.g.:
 - using different parts of the forest for different purposes
 - using the same area of the forest at different times to obtain more than one benefit

Content (continued)

- ☐ provides a definition of integrated land use, and cites examples in Alberta where a common area of forested land serves two or more purposes at the same time; e.g.:
 - wood fibre production and wildlife management
 - grazing, oil production and recreation
- ☐ compares and contrasts principles of multiple land use with principles of integrated land use
- ☐ explains the goals of Integrated Resource Planning (IRP)

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates solutions to problems

Information Sharing

- ☐ demonstrates effective use of two or more communication media: e.g., *written, oral, audio-visual*
- ☐ communicates ideas in a logical sequence with sufficient supporting detail
- ☐ maintains acceptable grammatical and technical standards
- ☐ cites five or more relevant information sources

REFLECTIONS/COMMENTS:

<i>Analyzing Issues</i>	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ analyzes five current issues in forest management: <ul style="list-style-type: none"> – accurately describes each issue – clarifies different points of view regarding each issue <i>e.g., social, economic, environmental</i> – identifies two or more useful alternatives regarding each issue – assesses each alternative on the basis of immediate/long-term consequences ☐ critiques one newspaper/magazine article or video documentary regarding an issue in forest management with respect to: <ul style="list-style-type: none"> – range of viewpoints/biases evident – validity/reliability of information presented – recommended course of action <p><i>See assessment tools generic to CTS:</i> <i>Assessment Framework: Issue Analysis (CTSISS)</i> <i>Guide to Critiquing Media Information (FORMED)</i></p>		
<i>Comparing Local and Global Issues</i>	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ accurately describes one international forest issue ☐ compares the international issue with a similar forest issue in Canada ☐ suggests two or more strategies/actions for dealing with the issue at local and global levels ☐ assesses each strategy/action on the basis of consequences for society, the economy and the environment <p><i>See assessment tools generic to CTS:</i> <i>Assessment Framework: Research Process (CTSRES)</i></p>		

<i>Citizenship: Goals and Actions</i>	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ explains different philosophies/ethics regarding the use of forests and how best to ensure their sustainability ☐ summarizes the goals and accomplishments of one environmental conservation group ☐ negotiates and debates one current issue in forest management: <ul style="list-style-type: none"> – clearly states a position on the issue – presents a convincing argument in logical sequence supporting the position – provides a relevant and convincing rebuttal to opposing arguments – develops a shared agreement on preferred alternatives ☐ through group consensus building, proposes a plan for the conservation and management of forested regions that includes individual actions, shared actions and leadership roles <p><i>See assessment tools generic to Forestry:</i> <i>Negotiation and Debate (FORNEG-3)</i></p>		
<i>Managing Learning</i>	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ sets clear goals and establishes steps to achieve them ☐ uses personal initiative to formulate questions and find answers ☐ demonstrates resourcefulness in gathering information ☐ plans and uses time effectively, prioritizing tasks on a consistent basis ☐ assesses and refines approach to task/project based on feedback and reflection 		

<i>Research and Communication</i>	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ accesses a range of relevant information sources and recognizes when additional information is required ☐ interprets, organizes and combines information in creative and thoughtful ways ☐ recognizes underlying bias/assumptions/values in information and ideas ☐ demonstrates effective use of a variety of communication media: <i>e.g., written, oral, multimedia</i> ☐ communicates thoughts/feelings/ideas clearly to justify or challenge a position ☐ maintains acceptable grammatical and technical standards through proofreading and editing ☐ gives evidence of adequate information gathering by citing relevant information sources 		

<i>Collaboration, Teamwork and Ethics</i>	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ works with a range of peer members ☐ shares information/opinions/suggestions, maintaining a balance between speaking and listening ☐ listens to and respects the views of others, requesting clarification as necessary from other group members ☐ negotiates with sensitivity solutions to problems ☐ assesses the consequences of personal/group actions on society and the environment 		

RATING SCALE	4 Meets project/task objectives in a self-directed manner, selecting and implementing the most appropriate course of action. Problems are solved in effective and creative ways. Quality and productivity exceed standards.	3 Meets project/task objectives in a self-directed manner, selecting and using resources/processes efficiently and effectively. No errors or deficiencies are noted. Quality and productivity consistently meet standards.	2 Meets project/task objectives with limited assistance in planning, solving problems and in selection and use of resources/ processes. Only minor errors/deficiencies are noted. Quality and productivity meet standards, but are occasionally inconsistent.	1 Completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Quality and productivity meet standard but are inconsistent.	0 Has not yet completed the task. Major deficiencies and/or errors are evident.

Assessment Criteria and Conditions:

- identifying and explaining applications of timber cruise data and nonfibre data in resource management
- demonstrate applications of a sample set of forest survey data

Suggested Reference(s):

- *Managing the Forest*
- *Woodlot Management Guide for the Prairie Provinces*
- *Natural Resources Measurements*
- *Forest Mensuration*

STANDARD: Respond to a standard of 3 on the rating scale.

Rating Scale

The student:

- 4 meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
- 3 meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
- 2 meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
- 1 completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
- 0 does not complete the task, or is unable to provide a suitable response.

N/A Not Applicable

G.102/ Forestry, CTS
(1997)

Background Information	Sample Questions/Activities
<p>See <i>Managing the Forest</i>, Inventory:</p> <ul style="list-style-type: none"> • Timber Inventory • What Tree is That? • Grouping Trees • What is a Tree? • Tree Growth • Measurement Activities • Maps • Air Photographs <p>See <i>Woodlot Management Guide for the Prairie Provinces</i>, Section F – Inventory:</p> <ul style="list-style-type: none"> • Steps to Conduct an Inventory • Maps • Cruising • Designing a Cruise • Measuring Cruise Plots • Plot Sizes • Measuring Tree Diameter • Measuring Tree Age • Measuring Tree Height • Processing Cruise Data • Sample Compilation 	<p>1. Discuss applications of timber cruise data in resource management; e.g.:</p> <ul style="list-style-type: none"> – estimating fibre volumes – projecting forest growth – planning harvest operations. <p>2. Perform mathematical calculations to determine timber volumes for a sample forested area.</p> <p>3. Explain applications of nonfibre data in resource management; e.g.:</p> <ul style="list-style-type: none"> – measures of water and soil quality – watershed potential – number and density of wildlife. <p>4. Discuss potential applications of sample nonfibre data obtained from local government/industry.</p> <p>5. Interpret a set of sample forest survey data; e.g.:</p> <ul style="list-style-type: none"> – consider bias, error and other limitations in the sample data – extrapolate the data to estimate forest populations – suggest applications of the data in resource management – suggest modifications to sample design that may increase accuracy of the survey. <p>6. Research applications of computer software in processing forest survey data.</p>

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0 N/A
Information Gathering and Processing	4	3	2	1	0 N/A
Content	4	3	2	1	0 N/A
Collaboration and Teamwork	4	3	2	1	0 N/A
Information Sharing	4	3	2	1	0 N/A

STANDARD IS 3 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

Assessment Tools

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TASK CHECKLIST*The student:***Preparation and Planning**

- ☐ sets clear goals and establishes steps to achieve them
- ☐ creates and adheres to detailed timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively, prioritizing tasks on a consistent basis

Information Gathering and Processing

- ☐ accesses a range of relevant information sources and recognizes when additional information is required
- ☐ demonstrates resourcefulness in collecting data
- ☐ interprets, organizes and combines information in creative and thoughtful ways
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ recognizes underlying bias/assumptions/values in information sources
- ☐ assesses and refines approach to the task and project status based on feedback and reflection

Content

- ☐ explains applications of aerial photography in current data collection practices
- ☐ interprets information regarding the forest resource in one or more aerial photographs
- ☐ _____

Content (continued)

- ☐ explains applications of satellite imagery in current data collection practices
- ☐ interprets one or more satellite images used in forest inventory
- ☐ _____
- ☐ explains applications of one or more computer-based mapping systems in data manipulation and/or data storage
- ☐ _____

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates with sensitivity solutions to problems
- ☐ displays effective communication and leadership skills

Information Sharing

- ☐ demonstrates effective use of a variety of communication media:
e.g., written, oral, audio-visual
- ☐ communicates thoughts/feelings/ideas clearly to justify or challenge a position
- ☐ maintains acceptable grammatical and technical standards
- ☐ gives evidence of adequate information gathering by citing seven or more relevant information sources

REFLECTIONS/COMMENTS:

Assessment Criteria and Conditions:

- given a range of relevant in-school/community resources, identifying and describing:
 - fibre and nonfibre products and services derived from Alberta's forests
 - forecasts regarding the future use of forests in Alberta and Canada

Suggested Reference(s):

- *Alberta's Focus on Forests*
- *Our Growing Resource*
- *Woodlot Management Guide for the Prairie Provinces*

STANDARD: Respond to a standard of 3 on the rating scale.

Rating Scale

The student:

- 4 meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
- 3 meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
- 2 meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
- 1 completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
- 0 does not complete the task, or is unable to provide a suitable response.

N/A Not Applicable

Background Information	Sample Questions/Activities
<p>See <i>Alberta's Focus on Forests</i>, Unit 4 – Forest Resources and Technologies:</p> <ul style="list-style-type: none"> • 4.2: Products from Canada's Forests • 4.3: Surveying the Forest Resource • 4.4: From Pulp to Paper • 4.5: Pulp and Paper: The Technology-Environment Connection. <p>See <i>Our Growing Resource</i>, Chapter 3: Production and Products – Today's Forest Industry:</p> <ul style="list-style-type: none"> • Lumber • Panelboard • Pulp and Paper. <p>See <i>Woodlot Management Guide for the Prairie Provinces</i>, Section III – Products/Markets:</p> <ul style="list-style-type: none"> • Fibre Markets • Energy • Christmas Trees • Food. 	<p>Sample Questions/Activities</p> <ol style="list-style-type: none"> 1. Identify 20 or more fibre-based products and services derived from Alberta's forests; e.g.: <ul style="list-style-type: none"> – primary wood products – wood-fabricated products – pulp and paper products – chemical products – food products. 2. Identify 10 or more nonfibre values derived from Alberta's forests; e.g.: <ul style="list-style-type: none"> – trapping, hunting and fishing – guiding and outfitting – tourism and recreational pursuits – ecological values – aesthetic and spiritual values. 3. Describe trends in the consumptive and nonconsumptive use of forests in Canada and Alberta; e.g.: <ul style="list-style-type: none"> – recreation – trapping – logging – oil and gas development. 4. Given a selected forest region, identify a range of forest products and services that could be derived from that site. 5. Identify a range of common products derived from a given tree species.

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0 N/A
Information Gathering and Processing	4	3	2	1	0 N/A
Content	4	3	2	1	0 N/A
Collaboration and Teamwork	4	3	2	1	0 N/A
Information Sharing	4	3	2	1	0 N/A

STANDARD IS 3 IN EACH APPLICABLE TASK**Rating Scale***The student:*

4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.

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0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

Assessment Tools

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TASK CHECKLIST*The student:***Preparation and Planning**

- ☐ sets clear goals and establishes steps to achieve them
- ☐ creates and adheres to detailed timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively, prioritizing tasks on a consistent basis

Information Gathering and Processing

- ☐ accesses a range of relevant information sources and recognizes when additional information is required

- ☐ demonstrates resourcefulness in collecting data
- ☐ interprets, organizes and combines information in creative and thoughtful ways
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ recognizes underlying bias/assumptions/values in information sources

- ☐ assesses and refines approach to the task and project status based on feedback and reflection

Content

- ☐ identifies, describes and sequences the steps/processes that are involved in one milling or pulping technology
- ☐ identifies materials and services that are required at each stage of production; e.g.:
 - human and natural resources
 - energy and technologies
 - inspection and regulation

Content (continued)

- ☐ describes products and/or services made available through applications of the milling or pulping technology
- ☐ develops a flow chart of steps and processes involved in the production process
- ☐ identifies potential affects of the milling or pulping process on the environment, and precautions taken by industry to eliminate/minimize environmental impact

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates with sensitivity solutions to problems
- ☐ displays effective communication and leadership skills

Information Sharing

- ☐ demonstrates effective use of a variety of communication media:
 - e.g., *written, oral, audio-visual*
- ☐ communicates thoughts/feelings/ideas clearly to justify or challenge a position
- ☐ maintains acceptable grammatical and technical standards
- ☐ gives evidence of adequate information gathering by citing seven or more relevant information sources

REFLECTIONS/COMMENTS:

STANDARD IS 3 IN EACH APPLICABLE TASK

RATING	ASSESSMENT CRITERIA
	<p><i>The student:</i></p> <p>Schedules Tasks</p> <p>☐ defines the task</p> <p>☐ identifies task components and organizes them into a logical sequence</p> <p>☐ uses time effectively</p> <p>☐</p> <p>Gathers Relevant Information</p> <p>☐ poses important questions regarding potential customers/markets</p> <p>☐ accesses basic in-school/community information sources regarding the product/service and potential customers/markets</p> <p>☐ interprets and organizes information into a logical sequence</p> <p>☐</p> <p>Develops the Plan</p> <p>☐ describes the product/service and marketing goals</p> <p>☐ assesses consumer preferences, and how these may be met through product diversification/specialization</p> <p>☐ identifies potential markets in North America, the Pacific Rim, Europe and two other selected regions</p> <p>☐ outlines the sequence of steps, materials, and processes involved in product/service development</p> <p>☐ establishes a pricing strategy based on market analysis and cost factors</p> <p>☐ establishes a packaging/labelling, advertising and promotion strategy consistent with marketing goals and consumer preferences</p> <p>☐ summarizes opportunities and challenges relevant to the marketing plan</p> <p>☐</p> <p>Assesses and Communicates the Plan</p> <p>☐ presents marketing plans in a logical sequence using two or more communication media</p> <p>☐ uses correct grammar and technical terms</p> <p>☐ predicts the likelihood of suggested outcomes/sales being realized</p> <p>☐ makes summative statements regarding strengths/weaknesses and general feasibility of the marketing plan</p> <p>☐</p>

Rating Scale

The student:

4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.

3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.

2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.

1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.

0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

REFLECTIONS / COMMENTS

<i>Industry Research</i>	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ identifies <u>six</u> or more types of forest research being conducted in Canada ☐ explains the role of the Alberta Forest Research Advisory Council in coordinating forest research activities in Alberta ☐ explains applications of data banks and information systems in forest research ☐ summarizes one current forest research project in Canada with respect to: <ul style="list-style-type: none"> – research objectives and participating agencies – information-gathering strategies – project status and implications for forest industry <p><i>See assessment tools generic to Forestry: Presentations/Reports (FORPRE-3)</i></p>		
<i>Technology Applications</i>	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ identifies applications of technology in six or more sectors of the forest industry (e.g., inventory, silviculture, protection, harvest, processing, management) ☐ analyzes <u>three</u> technologies currently used in the forest industry by identifying: <ul style="list-style-type: none"> – specific problems/needs being addressed – basic components and principles of operation – benefits and costs with respect to social/economic/environmental factors ☐ describes <u>one</u> or more emerging technologies in the forest industry and needs being addressed <p><i>See assessment tools generic to CTS: Assessment Framework: Research Process (CTSRES)</i></p>		

<i>Technology Careers</i>	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ identifies occupational opportunities within six career clusters related to forest technology (e.g., inventory, silviculture, protection, harvest, processing, management) ☐ describes employment conditions and requirements within one career cluster (e.g., job description/working conditions, remuneration, entry requirements, training opportunities, potential for advancement/entrepreneurship) ☐ makes forecasts regarding career trends in forest technology, future occupational opportunities and related employment conditions and requirements <p><i>See assessment tools generic to Forestry: Career Search: Advanced Level (FORCAR-3)</i></p>		
<i>Managing Learning</i>	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ sets clear goals and establishes steps to achieve them ☐ uses personal initiative to formulate questions and find answers ☐ plans and uses time effectively, prioritizing tasks on a consistent basis ☐ assesses and refines approach to task/project based on feedback and reflection 		

FOREST TECHNOLOGY APPLICATIONS (continued)

FOR3080-1

Research and Communication	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ accesses a range of relevant information sources and recognizes when additional information was required ☐ interprets, organizes and combines information in creative and thoughtful ways ☐ records information accurately with appropriate supporting detail and using correct technical terms ☐ demonstrates effective use of a variety of communication media: <i>e.g., written, oral, multimedia</i> ☐ maintains acceptable grammatical and technical standards through proofreading and editing ☐ gives evidence of adequate information gathering by citing relevant information sources 		

Collaboration and Teamwork	Minimum Level of Performance 3	Observed Level of Performance
<p><i>The student:</i></p> <ul style="list-style-type: none"> ☐ cooperates with group members ☐ shares work appropriately among group members ☐ negotiates solutions to problems ☐ displays effective communication and leadership skills 		

RATING SCALE	4	3	2	1	0
	Exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.	Meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.	Meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.	Meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.	Has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

SILVICULTURE

- biotechnology
- scarification
- vegetation control
-
-
-

FOREST INVENTORY/PROTECTION

- laser disc technology
- Geographic Information Systems (GIS)
- Global Positioning Systems (GPS)
-
-
-

GREEN HOUSE AND NURSERY OPERATIONS

- container systems
- environmental control systems
- packaging and storage systems
-
-
-

FOREST HARVEST

- feller bunchers
- delimbers
- on-site chipping
- on-board computer control systems
-
-

WOOD PRODUCTION AND UTILIZATION

- lasers in sawmills
- pulping technology
- computer process control
-
-
-

FOREST MANAGEMENT

- satellite imagery
- aerial photography
-
-
-
-

Assessment Criteria and Conditions:

- identifying and describing:
 - organic and inorganic components of forest soils and their function in forest ecosystems
 - major types of air pollutants and their affect on forest ecosystems

Suggested Reference(s):

- *Alberta's Focus on Forests*
- *Woodlot Management Guide for the Prairie Provinces*

STANDARD: Respond to a standard of 3 on the rating scale.

Rating Scale

The student:

- 4 meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
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- 1 completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
- 0 does not complete the task, or is unable to provide a suitable response.

N/A Not Applicable

Background Information	Sample Questions/Activities
<p>See <i>Alberta's Focus on Forests</i>, Unit 3 – Conditions Affecting Growth:</p> <ul style="list-style-type: none"> • 3.1: A Lot Depends on Location • 3.2: Life History of a Tree • 3.3: Woodland Whodunit • 3.4: Forests: Thriving or Declining • 3.5: Controlling Fire • 3.6: Urban Wilderness at School. <p>See <i>Woodlot Management Guide for the Prairie Provinces</i>, Section I – Woodlot Assessment:</p> <ul style="list-style-type: none"> • Forest Ecology • Ecological Areas • Soils • Tree Species. 	<p>1. Describe physical characteristics used to classify forest soils, and the effect of different soils on plant growth; e.g.:</p> <ul style="list-style-type: none"> – texture – porosity. <p>2. Explain the function or organic and inorganic components of forest soils; e.g.:</p> <ul style="list-style-type: none"> – micro- and macro-organisms – gases and minerals – organic matter – water. <p>3. Explain the effects of soil acidity, alkalinity and temperature on the growth of trees and other forest plants.</p> <p>4. Describe indicators of water quality in the forest, and its effects on trees and other plants; e.g.:</p> <ul style="list-style-type: none"> – surface water – ground water. <p>5. Describe the effects of known air pollutants on forest ecosystems; e.g.:</p> <ul style="list-style-type: none"> – ozone – particulate matter – oxides and nitrogen – sulphur dioxide.

TASK	OBSERVATION/RATING				
Management	4	3	2	1	0 N/A
Teamwork	4	3	2	1	0 N/A
Equipment and Materials	4	3	2	1	0 N/A
Investigative Techniques	4	3	2	1	0 N/A

STANDARD IS 3 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
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- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST*The student:***Management**

- ☐ prepares self for task
- ☐ organizes and works in an orderly manner
- ☐ interprets and carries out instructions accurately
- ☐ plans and uses time effectively in a logical sequence
- ☐ displays leadership in adhering to routine procedures
- ☐ attempts to solve problems prior to requesting help

Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates with sensitivity solutions to problems
- ☐ displays effective communication skills

Equipment and Materials

- ☐ independently selects and uses equipment/materials
- ☐ demonstrates concern for safe procedures/techniques
- ☐ measures accurately and efficiently
- ☐ practises proper sanitation procedures
- ☐ minimizes waste of materials
- ☐ anticipates potential hazards and emergency response

Investigative Techniques

- ☐ identifies two or more local soil types using soil triangle and hand texturing techniques
- ☐ makes predictions that can be tested regarding the effects of:
 - soil pH on the growth of trees
 - temperature on the growth of trees
 - water quantity on the growth of trees
- ☐ plans and conducts field investigations to test each predictions
- ☐ uses relevant information to explain observations regarding the effects of soil pH, temperature and water quantity on the growth of trees
- ☐ analyzes relationships among manipulated/responding variables
- ☐ obtains accurate results that confirm/reject each prediction and answer related questions
- ☐ summarizes, applies and evaluates observations and experimental outcomes

REFLECTIONS/COMMENTS:

INFERENCE

Definition: to derive a conclusion from facts or premises

Synonyms: infer, deduce, deduct, draw, gather, judge

Criteria for Assessing Inferences

Inferences made in advanced level modules should:

- communicate the process used to derive conclusions
- be reliable and valid in light of information gathered.

Inferences must be communicated in a logical sequence with sufficient supporting detail. Both the type and amount of information used to derive a conclusion are important in determining the reliability/validity of the inference.

Each inference made regarding interrelationships in forest ecosystems should provide:

- a clear statement of the factors being investigated
- relevant facts and detail that support more than one point of view;
e.g., cultural, ethical, economic, environmental, health-related, scientific, political
- a logical sequence of ideas that lead to a conclusion
- evidence that different points of view were considered in deriving the conclusion
- a valid and realistic conclusion that is based on analysis and synthesis of information.

Causal Relationships and Inferences

The student makes two or more inferences regarding each of the following:

- ☐ the effects of local forests on soil; e.g.:
 - nutrient content
 - hydrologic cycle
 - pH balance
- ☐ the effects of local forests on water; e.g.:
 - surface water
 - ground water
- ☐ the effects of local forests on weather
- ☐ the effects of local forests on biotic factors; e.g.:
 - plants
 - animals
- ☐ the effects of global forests on climate
- ☐ structural adaptations of living organisms to changes in a forest environment; e.g.:
 - adaptation to site conditions
 - reproductive adaptation
- ☐ behavioural adaptations of living organisms to changes in a forest environment

RATING SCALE

4	3	2	1	0
Exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.	Meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.	Meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.	Meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.	Has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Information Gathering and Processing	4	3	2	1	0
Content	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Information Sharing	4	3	2	1	0

STANDARD IS 3 IN EACH APPLICABLE TASK**Rating Scale**

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
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Assessment Tools

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TASK CHECKLIST

The student:

Preparation and Planning

- ☐ sets clear goals and establishes steps to achieve them
- ☐ creates and adheres to detailed timelines
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- ☐ accesses a range of relevant information sources and recognizes when additional information is required
- ☐ demonstrates resourcefulness in collecting data
- ☐ interprets, organizes and combines information in creative and thoughtful ways
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ recognizes underlying bias/assumptions/values in information sources
- ☐ assesses and refines approach to the task and project status based on feedback and reflection

Content

- ☐ explains how each tree species has unique site and climatic requirements that determine its ability to grow in particular environments
- ☐ provides descriptive accounts of the silvics of five common Alberta tree species; e.g.:
 - tree form
 - growth patterns and life cycle
 - soil requirements

Content (continued)

- climatic and moisture requirements
- aspect and elevation
- ☐ provides descriptive accounts of the structural characteristics and environments of three common Alberta forest associations, and factors that have determined their existence; e.g.:
 - location on a map
 - soil type
 - position of slope
 - overstorey and dominant understorey

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates with sensitivity solutions to problems
- ☐ displays effective communication and leadership skills

Information Sharing

- ☐ demonstrates effective use of a variety of communication media:
 - e.g., *written, oral, audio-visual*
- ☐ communicates thoughts/feelings/ideas clearly to justify or challenge a position
- ☐ maintains acceptable grammatical and technical standards
- ☐ gives evidence of adequate information gathering by citing seven or more relevant information sources

REFLECTIONS/COMMENTS:

COMMON FOREST ASSOCIATIONS IN ALBERTA

FOR3090-5

Natural Subregion	Forest Association	Structure	Soil Texture	Soil Moisture	Slope Position
Montane	Lodgepole Pine/Bearberry	Tree/Shrub	silty loamy	Very dry	Upper
	White Spruce/Horsetail	Tree/Forb	peaty	Wet	Toe
	Aw-Sw-Pi/Hairy Wild Rye	Tree/Grass	fine loamy to clayey	Moist	Upper
	Lodgepole Pine/Lichen	Tree/Lichen	sandy	Very dry	Upper
Lower Foothills	Pi-Sb/Labrador Tea	Tree/Shrub	loamy or clayey	Moist	Middle
	Sb-Pi/Labrador Tea	Tree/Shrub	silt loam to silty clay loam	Wet	Lower
	Treed Bog	Tree/Shrub	organic	Wet	Depression
	Sb-Sw/Labrador Tea/Horsetail	Tree/Shrub/Forb	organic	Wet	Toe
	Aw-Sw-Pi/Low Bush Cranberry	Tree/Shrub	fine loamy clayey	Moist	Middle
	Treed Poor Fen	Tree/Shrub	organic	Wet	Depression
	Aw-Sw-Pi/Bracted Honeysuckle	Tree/Shrub	fine loamy - clayey	Moist	Lower
	Aw-Sw-Pi/Hairy Wild Rye	Tree/Grass	Fine loamy	Dry	Upper
Upper Foothills	Lodgepole Pine/Lichen	Tree/Lichen	fine loamy clayey	Very dry	Upper
	Pi-Sb/Labrador Tea	Tree/Shrub	fine loamy clayey	Moist	Middle
	Sb-Pi/Labrador Tea	Tree/Shrub	silt loam to clay loam	Wet	Lower
	Treed Bog	Tree/Shrub	organic/foam	Wet	Depression
	White Spruce/Horsetail	Tree/Forb	silty loam - clay loam	Wet	Lower
	Pi/Tall Bilberry	Tree/Shrub	fine loamy - clayey	Moist	Upper
	Pi/Hairy Wild Rye	Tree/Grass	fine loamy	Dry	Upper
	Pi/Bracted Honeysuckle	Tree/Shrub	silt loam to clay foam	Wet	Toe

Natural Subregion	Forest Association	Structure	Soil Texture	Soil Moisture	Slope Position
Boreal Mixed Wood	Jack Pine/Lichen	Tree/Lichen	sandy, loamy sandy	Very dry	Upper
	Pi-Sb/Labrador Tea	Tree/Shrub	clayey to loamy	Moist	Middle
	Sb-Pi/Labrador Tea	Tree/Shrub	variable	Moist	Lower
	Treed Bog	Tree/Shrub	organic	Wet	Toe
	Sb/Labrador Tea/Horsetail	Tree/Shrub	variable	Wet	Toe
	Pi-Aw/Blueberry	Tree/Shrub	sandy-loamy sand	Dry	Upper
	Aw-Sw/Low Bush Cranberry	Tree/Shrub	loamy to clayey	Moist	Middle
	Pb-Aw/Dogwood	Tree/Shrub	loamy to clayey	Moist	Lower
Foothills Parkland Central Parkland	Sw/Horsetail	Tree/Forb	peaty	Moist	Toe
	Aw/Saskatoon/Sarsaparilla	Tree/Shrub/Forb	loamy or clayey	Dry to moist	Middle to upper
	Aw/Saskatoon/Sarsaparilla	Tree/Shrub/Forb	loamy or clayey	Dry to moist	Middle to upper
	Aw-Pb/High Bush Cranberry	Tree/Shrub	loamy or clayey	Moist	Depressions
Peace River Parkland	Pb/Dogwood/Horsetail	Tree/Shrub/Forb	loamy or clayey	Moist	Flats and Depressions
	Pb/Dogwood/Horsetail	Tree/Shrub/Forb	loamy or clayey	Moist	Flats and Depressions

Tree Species Abbreviations:

Aw – Trembling Aspen
Pb – Balsam Poplar
Pi – Lodgepole Pine
Pj – Jack Pine
Sb – Black Spruce
Sw – White Spruce

Definitions

Forb: any non-woody plant species other than grass or a grass-like plant.

Grass: any member of the grass family.

Shrub: any woody species with relatively low growth habit; often has several basal shoots

Tree: a woody species with a single bole that is normally taller than a shrub.

COMMON FOREST ASSOCIATIONS IN THE CENTRAL PARKLAND SUBREGION

Schematic A

Forest Association	Aw/Saskatoon/ Sarasparrilla	Loamy or clayey	Aw-Pb/High Bush Cranberry	Loamy or clayey	Pb/Dogwood/ Horsetail	Loamy or clayey
Soil Texture	Dry to Moist		Moist		Moist	
Soil moisture	Very dry		Moist		Moist

COMMON FOREST ASSOCIATIONS IN THE MONTANE SUBREGION

Schematic B

Forest Association	Pi/Bearberry	Silty loamy	Sw/Horsetail	Peaty	Wet	Aw-Sw-Pi/Hairy Wild Rye	Fine loamy to clayey	Moist
Soil Texture	Very dry		Wet		Moist		Moist	
Soil moisture	Very dry		Wet		Moist		Moist

COMMON FOREST ASSOCIATIONS IN THE LOWER FOOTHILLS SUBREGION

Schematic A

Forest Association	Pi/Lichen	PL/Sb/ Labrador Tea	Sb-Pi Labrador Tea	Treed Bog	Sb-Sw/ Labrador Tea /Horsetail	Aw-Sw-Pi/ Low Bush Cranberry
Soil Texture	Sandy	Loamy or clayey	Silt loam to silty clay loam	Organic	Organic	fine Loamy clayey
Soil moisture	Very dry	Moist	Wet	Wet	Wet	Moist

Schematic B

Forest Association	Treed poor fen	Organic	Wet	Aw-Sw-Pi Bracted Honeysuckle	Fine Loamy Clayey	Moist	Aw-Sw-Pi/ Low Bush Cranberry	Fine loamy clayey	Moist	Aw-Sw-Pi/ Hairy Wild Rye	Fine loamy	Dry
Soil Texture	Wet		Moist		Moist		Moist		Moist		Dry	
Soil moisture	Wet		Moist		Moist		Moist		Moist		Dry

COMMON FOREST ASSOCIATIONS IN THE UPPER FOOTHILLS SUBREGION

Schematic A

Forest Association	Pi/Lichen	Pi-Sb/Labrador Tea	Sb-Pi/Labrador Tea	Tree Bog	Sw/Horsetail
Soil Texture	Sandy	Loamy or clayey	Silt loam to silty clay loam	Organic	Peaty
Soil moisture	Very dry	Moist	Wet	Wet	Moist

Schematic B

Forest Association	Pi/Tail Bilberry	Pi/Hairy Wild Rye	Pi/Bracted Honeysuckle
Soil Texture	Fine loamy - clayey	Fine loamy	Silt loam to clay loam
Soil moisture	Moist	Dry	Wet

COMMON FOREST ASSOCIATIONS IN THE BOREAL MIXEDWOOD SUBREGION

Schematic A

Forest Association	Pi/Lichen	Pi-Sb/Labrador Tea	Sb-Pi/Labrador Tea	Tree Bog	Sb/Labrador Tea/Horsetail
Soil Texture	Sandy to loamy sand	Clayey to loamy	Variable	Organic	Variable
Soil Moisture	Very dry	Moist	Moist	Wet	Moist

Schematic B

Forest Association	Pi-Aw/Blueberry	Aw-Sw/Low Bush Cranberry	Pb-Aw/Dogwood	Sw/Horsetail
Soil Texture	Sandy - loamy sand	Loamy to clayey	Loamy to clayey	Peaty
Soil Moisture	Dry	Moist	Moist	Moist

Introduction

The identification guide includes only the most common insects and diseases that affect the forests of Alberta. It comprises the following identification keys:

Key 1: General	Key 5: Animal Damage
Key 2: General	Key 6: Disease
Key 3: Abiotic Injury	Key 7: Disease
Key 4: Abiotic Injury	Key 8: Insect Damage.

Each key is not intended to be exhaustive in pests and pest damages it can be used to identify. The key serves only as a beginner's guide to the identification of some common agents of forest change in Alberta.

Each identification key is based on information provided from the following source:

Finck, Kelly E., P. Humphreys and G. Hawkins. 1989. *Field Guide to Pests of Managed Forests in British Columbia*. Forestry Canada and B.C. Ministry of Forests, Victoria, B.C. Joint Publ. No. 16. 188p.

Glossary of Terms

Chlorotic:	yellowish foliage owing to lack of chlorophyll
Frass:	solid excrement and chewed debris from insects, especially larvae
Galleries:	wandering tunnels or cavities under bark or in wood, associated with bark beetles or wood borers
Pitch tubc:	a lump of pitch accumulating on the outside of the bark of a conifer resulting from pitch flow caused by bark beetle attack
Resinosis:	an abnormal flow of pitch from a conifer usually in response to infection, insect activity or wounding

Assessment Tools

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Using the Keys

There are various factors/agents that cause damage in forest stands and in wood products. These can be grouped into the following categories:

- disease
- abiotic injuries—primarily owing to climatic and soil factors
- animal damage
- insect damage.

When identifying the cause of damage in a forest stand we usually focus attention on the symptoms because they are visible. The first step is to use

General Keys to determine which of the above agents of change are responsible.

Notice that each of the keys provides two choices, e.g.:

- a. whole tree affected
 - b. part of the tree affects.
- Read both choices before selecting the appropriate one.

The General Keys will direct you to one of the above agents of change (disease, abiotic injury, animal damage or insect damage). Some of the keys will identify a large group of pests (e.g., trunk rots or root rots). Since there are many species of these pests, they are significant in the changes they cause in a stand of trees.

The key on animal damage is based on symptoms. Specific animals causing the damage are not identified as the key is intended to establish the type of damage observed. The insects and diseases included in these keys are representative of the most common organisms found in the forests of Alberta.

You will use the identification guide to identify:

- 4 living agents of change
- 4 nonliving agents of change.

KEY 1 – GENERAL 1**a. Whole tree affected**

- b. Crown entirely or partially discoloured, bright yellow, brown or red or lacking foliage; trees may be broken, laying on ground or erect and lower stem buried in sediment; crown, if present, may not be deformed
- c. Widespread area affected, especially in low lying areas or in bands along slopes, near industrial sites, adjacent to streams or on lower slopes in mountainous terrain; trees in small clumps are uniformly affected

Key 4 Abiotic Injuries 2

- c. Trees affected randomly and to a varying extent
- d. Resinosis present on stem or at root collar
- e. Resinosis at root collar

- f. Resinosis, mycelia, fruiting bodies around root collar

Key 6 Disease 1

- f. Resinosis, galleries, frass around root collar, roots chewed

Key 8 Insect Damage

- e. Resinosis, swelling, cankers or fruiting bodies on main stem or branches

Key 6 Disease 1

- d. Bark removal from stems or roots

Key 5 Animal Damage

- b. Crown thin, chlorotic, poor growth, crown not generally deformed
 - g. Widespread area affected, impact on trees quite uniform, no evidence of disease, no industrial site nearby nor are trees on poor sites

Key 3 Abiotic Injuries 1

- g. Affected trees in patches or scattered individuals, standing dead and/or windthrown trees; trees affected to varying degrees

Key 6 Disease 1**a. Part of tree affected**

- h. Foliage, leaders and/or branch tips affected

Key 2 General 2**h. Main stem and/or branches affected**

- a. Trees erect or windthrown in random manner, cankers, fruiting bodies, resinosis, brooms or swellings

Key 6 Disease 1

- i. No cankers, fruiting bodies, resinosis, brooms or swellings
 - j. Splintered breakage of main stem, tops and/or branches, windthrown trees lying all in the same direction

Key 3 Abiotic Injuries 1

- j. Pitch, frass or cottony tufts present, branch or main stem gouting and /or breakage which may or may not be present

Key 8 Insect Damage**KEY 2 – GENERAL 2****a. Foliage affected**

- a. Trees affected in widespread area, especially in low lying areas or in bands along slopes
- b. Trees affected in large to small areas, generally to varying extent
- c. Needles uniformly coloured or mottled small fruiting bodies or blisters present, main stems or branches may not be affected

Key 3 Abiotic Injuries 1**Key 6 Disease 1**

- c. Extensive defoliation or needles uniformly discoloured or mottled, generally from top of crown downward and from the tips inward, chewed or clipped needles, mined buds, exit holes, webbing, frass and/or insects present

Key 8 Insect Damage**a. Leaders and/or branch tips affected**

- d. Bark removed or tips clipped off

Key 5 Animal Damage

- d. Bark not stripped, tips and/or buds not clipped
 - e. Tips may or may not curl, buds or needles mined, exit holes, frass, webbing or cottony tufts present

Key 8 Insect Damage

- e. Tips discoloured

- f. Small dark fruiting bodies or white to orange blisters or cankers on bark

Key 6 Disease 1

- f. Buds mushy, in low lying areas or industrial site nearby

Key 3 Abiotic Injuries 1

KEY 3 – ABIOTIC INJURIES 1**(Injuries to Crown/Foliage or Tips)**

- a. Tree leaning, windthrown or laying on ground

Key 4 Abiotic Injuries 2

- a. Tree erect

- a. Damage to main stem and/or branches

- b. Damage to crown

Foliage discoloured or leaders and branch tips damaged

- c. Tips of leaders, branches or branchlets affected (including buds). Damage most intense in depressions. Buds, new shoots, and needles brown in spring. Shoots and needles brown in the fall. Mushy buds, all species in a stand may be affected.

Frost Damage

- c. Foliage discolouration not restricted to the leader, branch or branchlet tips. No evidence of insects, animals or disease. No industrial site nearby; generally no noticeable discolouration/necrosis or deciduous and/or shrub layer. Crown is deep red-brown to brown

- d. Damage in an elevational band along a slope

Red Belt Injury

- d. Damage does not extend in a band along a slope; needles, if any, lacking flecking

- e. Crown is brown from top down and from new to old needles; needles may drop especially in late summer

Drought Damage

- e. Crown devoid of foliage or entire crown reddish brown, scorched appearance, evidence or burned bark.

Fire Damage**KEY 4 – ABIOTIC INJURIES 2****(Injuries to Main Stem/Branches or Whole Tree)**

- a. Tree leaning, windthrown or broken; young to mature trees

- b. Trees windthrown or broken

- c. Trees blown over, crown intact, root "mats" present, trees lie in one direction, branches and stem of adjacent trees may be scarred or splintered)

Wind Damage (Windthrow and/or Windsnap)

- c. Evidence of numerous broken trees aligned at right angles to the slope on steep middle and lower slopes; sharp demarcation between old and young trees, damaged area may be occupied by shrubs and forbs.

Avalanche Damage

- b. Young trees bent over or deformed, older trees with uneven and splintered breakage of tops and/or upper branches, cankers not evident

Snow or Ice Damage

- a. Tree erect, damage to main stem and/or branches

- d. Bark removal of main stem generally evident

- e. Main stem severely debarked and deeply gouged, exposed wood splintered; evidence of logging or construction activities adjacent, may also be associated with adjacent windfall

Mechanical Damage

- e. Main stem may be debarked but no evidence of gouging, splintering on wood; evidence or burned branch ends and charcoal

Fire Damage

- d. Main stem not severely damaged

- f. Branches and/or top not broken or splintered, cankers not evident

Snow and Ice Damage

- f. Branches and/or top not broken or splintered

- g. Upper surface of branches have wounds or scars associated with green ragged crown, lesions may or may not be on main stem

Hail Damage

- g. Lesions on main stem, bark removed from lesion or lower stem buried

- h. Elongated basal scars at ground level

Fire Scar

- h. Lower section of stem buried by sediment from adjacent stream. Level topography adjacent to a stream. Evidence of periodic deposition of overburden.

Flooding Damage

KEY 5 – ANIMAL DAMAGE

- a. Bark removed from roots, branches or stem

Debarking

- a. Portions of stems, twigs or branches severed, cut or splintered

- b. A relatively clean cut on twig, branch or stem
c. Stems and/or branches severed, multiple tooth marks on wood, numerous chips on ground below damage

Cutting

- c. Single, smooth, oblique cut, lack of multiple tooth marks

Clipping

- b. Twigs or stem with a ragged, torn appearance

Browsing **KEY 6 – DISEASE 1****Diseases of roots and those affecting more than one kind of tissue**

- a. **Whole tree affected**

No cankers; scattered pockets of trees with thin chlorotic crowns with poor growth or standing dead, wind toppled trees in criss-cross pattern, trees of all ages affected

Root Rots

- a. **Part of tree affected**

- b. Part of crown affected

Crown red, dead top and/or branches, cankers on main stem and/or branches on pines only

Key 7 Disease 2

- b. Either foliage or stem and/or branches affected

Main stem and/or branches affected

- c. Mature to overmature stand with conks visible on the main stem or at the base of the tree

Key 7 Disease 2

- c. Young to mature stand, stem lacks conks but may have flattened areas or swellings; brooms may occur in the crown

- d. no pronounced swelling, necrotic areas consist of flattened or depressed tissue

- d. Spindle to oval-shaped swellings present and/or deformation, necrotic areas raised

- e. No brooms or aerial shoots

Key 7 Disease 2

- e. Brooms present

Minor needle discolouration, no blisters on needles, aerial shoots or basal cups on swollen areas of branches and brooms. Aerial shoots around in cross section, branch pattern whorled.

Lodgepole Pine Dwarf Mistletoe

KEY 7 – DISEASE 2

Cankers, Rusts and Trunk Rots

- a. Various types of fungal fruiting bodies (conks) visible on tree trunks or fruiting bodies on ground near base of tree

Trunk Rots

- a. Absence of conks or fruiting bodies on stem or near base of tree
- No noticeable swelling on stem, necrotic areas consist of flattened or depressed tissue, dead bark may have sloughed off stem
 - On Aspen, rough, flattened area, black cracked bark

Hypoxylon Canker

- On Lodgepole Pine, elongated sunken, perennial canker, usually on lower bole. Resinosis, branch flagging, blue-black stain in sapwood under the canker

Atropellis Canker

- Spindle to oval-shaped swellings present on pines, raised necrotic areas on main stem and/or branches. Noticeable blistering of bark, sometimes elongated scars. Fruiting structures are white, yellow or orange powdery blisters.

Pine Stem Rusts

KEY 8 INSECT DAMAGE

- Entire crown affected

- Coniferous hosts. Needles chewed to varying degrees, needle stubs may or may not remain on the tree

Defoliators (Sawflies or Budworms)

- Deciduous hosts

Defoliators (Tent Caterpillars, Leaf-Eating Beetles, Leaf Miners)

- Leaders and branches, stems or roots affected

- Main stems affected

- Entire tree dying, crown yellow or reddish brown; boring dust around base of tree, tunnels on inside of bark

Bark Beetles

- Tree may be alive or dead; may have presence of sap flow from insect entrance holes; insect feeding penetrates deeply into wood

Wood Borers or Carpenter Ants

- Roots or root collar area affected. Pitch tubes at root collar. Resin-soaked duff near root collar. Trees up to 3 m tall are most susceptible, entire crown may be reddish.

Warren's Root Collar Weevil

Assessment Criteria and Conditions:

- identifying and describing:
 - major components of silviculture, including stand establishment, stand management and harvest
 - the silvics of five Alberta tree species.

Suggested Reference(s):

- *Our Growing Resource*
- *Woodlot Management Guide for the Prairie Provinces*
- *Native Trees of Canada*

STANDARD: Respond to a standard of 3 on the rating scale.

Rating Scale

The student:

- 4 meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
- 3 meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
- 2 meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
- 1 completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
- 0 does not complete the task, or is unable to provide a suitable response.

N/A Not Applicable

Background Information	Sample Questions/Activities
<p>See <i>Our Growing Resource</i>, Chapter 2 – The Challenge of Sustainable Development:</p> <ul style="list-style-type: none"> • Managing Forest Development • Integrated Resource Management – Accommodating Many Uses • Harvest Planning and Practices • Reforestation • Air and Water Quality • Building Sustainable Businesses. <p>See <i>Woodlot Management Guide for the Prairie Provinces</i>, Section IV – Woodlot Management:</p> <ul style="list-style-type: none"> • Management Planning • Reforestation • Stand Tending • Harvest • Fire Protection. 	<ol style="list-style-type: none"> 1. Provide a comprehensive definition of silviculture and its role in forestry. 2. Identify and explain major components of silvicultural systems, including: <ul style="list-style-type: none"> – stand establishment – stand management – harvest and cutting methods. 3. Explain how individual tree species have unique ecological requirements that determine suitable silvicultural practices. 4. Describe and compare the silvics of five or more Alberta tree species with respect to: <ul style="list-style-type: none"> – growth characteristics – reproduction habitat requirements (e.g., soil, water, temperature). 5. Describe one or more research programs designed to improve silvicultural practices; e.g.: <ul style="list-style-type: none"> – biotechnology – application of information technology – cultural/operational applications. 6. Develop a glossary of 20 or more terms relevant to silviculture.

A. TREE NAME

1. Common: _____

2. Botanical: _____

B. GROWTH FORM

C. HABITAT REQUIREMENTS

1. Climate: _____

2. Soils and Topography: _____

3. Associated Trees and Shrubs: _____

DISTRIBUTION

(as outlined on a map of Canada)

D. LIFE HISTORY

1. Reproduction and Early Growth

(a) Flowering and Fruiting:

(b) Seedling Development:

(c) Vegetative Reproduction (if applicable):

2. Sapling to Maturity

(a) Growth and Yield:

(b) Reaction to Competition:

(c) Major Enemies:

GROWTH FORM
(as sketched or outlined)

TASK	OBSERVATION/RATING				
Management	4	3	2	1	0
Teamwork	4	3	2	1	0
Equipment and Materials	4	3	2	1	0
Investigative Techniques	4	3	2	1	0

STANDARD IS 3 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

TASK CHECKLIST*The student:***Management**

- ☐ prepares self for task
- ☐ organizes and works in an orderly manner
- ☐ interprets and carries out instructions accurately
- ☐ plans and uses time effectively in a logical sequence
- ☐ displays leadership in adhering to routine procedures
- ☐ attempts to solve problems prior to requesting help

Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates with sensitivity solutions to problems
- ☐ displays effective communication skills

Equipment and Materials

- ☐ independently selects and uses equipment/materials
- ☐ demonstrates concern for safe procedures/techniques
- ☐ measures accurately and efficiently
- ☐ practises proper sanitation procedures
- ☐ minimizes waste of materials
- ☐ anticipates potential hazards and emergency response

Investigative Techniques

- ☐ uses relevant information to explain observations regarding natural regeneration; e.g.:
 - seed supply
 - vegetative reproduction
- ☐ uses relevant information to explain observations regarding artificial regeneration; e.g.:
 - direct seeding
 - bare-root/container seedlings
- ☐ makes predictions that can be tested regarding one or more methods of regeneration
- ☐ plans, sets up and conducts experiments to test a prediction
- ☐ analyzes relationships among manipulated/responding variables
- ☐ obtains accurate results that confirm/reject prediction and answers related questions
- ☐ summarizes, applies and evaluates observations and experimental outcomes; e.g.:
 - for species with wind-disseminated seed, assesses height and/or age of seedlings as a function of distance from edge of cutblock
 - for species with slash borne cones, assesses whether adequate seed is available per unit area
 - for direct seeding, is sufficient seed being broadcast to insure block stocking?
 - for bare root/container planting, are sufficient seedlings being planted to insure a fully stocked stand?

REFLECTIONS/COMMENTS:

TREE IMPROVEMENT

1. Explain major objectives of a tree improvement program.
2. Identify factors to consider in choosing a natural seed production area.
3. Cite advantages and disadvantages of clonal and seedling seed orchards.
4. Describe methods of increasing seed production in a seed production area.

CONE COLLECTION

1. Identify major factors influencing seed production in conifers.
2. Large cone crops in pine occur if climatic conditions are favourable. What stages of flower and cone development are the most critical? What kind of climatic conditions favour each of these stages?
3. Identify reasons for conducting a cone crop survey.
4. Describe methods of collecting cones from natural forest stands.
5. Seed testing is carried out for a number of parameters. Identify and explain three of them.
6. Identify and explain one physical test conducted to determine the viability of seed.

SITE PREPARATION

1. Provide reasons for ensuring adequate site preparation.
2. Describe mechanical methods of site preparation.
3. Explain advantages of a brush rake over an angled dozer blade in scarification operations.
4. Identify two functions of a drag type scarifier.
5. Identify types of mechanical scarification equipment that are commonly used in addition to those listed above.

SEEDING

1. Identify factors that determine the timing of a successful direct seeding operation.
2. What is the recommended time of year for carrying out a conifer seeding operation in Alberta? Give reasons for conducting conifer seeding operations at this time.
3. Seeding operations in Alberta have at times failed. Identify factors that may influence the success rate of seeding operations.
4. Identify biological advantages of spot seeding over broadcast seeding.

CONTAINER PLANTING

1. Explain requirements of a successful container system.
2. Describe desirable physical characteristics of container seedlings.
3. Explain advantages of growing seedlings in containers rather than as bare root stock in a nursery.
4. One of the critical elements in survival of a tree seedling is to maintain a favourable water balance. What is meant by the water balance? How can a tree seedling maintain a favourable water balance?

INTERMEDIATE STAND TREATMENTS

1. Define and give examples of intermediate stand treatments.
2. What is the major objective of release cutting? Identify the predominant growth stage(s) for trees that are released.
3. Describe methods of undertaking a liberation cut in a stand. Identify advantages and disadvantages of each method.

PRUNING

1. Identify and explain three stages of natural pruning. Briefly describe factors that may affect each stage.
2. Identify and describe three objectives of artificial pruning.
3. Explain potential hazards that may result from the excessive pruning of spruce trees.
4. What minimum live crown ratio should be attained when pruning?
5. Cite reasons for pruning conifers in the late winter or early spring.

PRUNING (continued)

6. Why is it important when pruning large diameter limbs (i.e., over 4 cm in diameter) that the initial cut be made 10 to 15 cm away from the bole of the tree?
7. Explain why hand pruning saws have curved blades and teeth pointing back toward the handle.
8. Why is it important when pruning to make a clean cut that is flush with the bole?

FERTILIZATION

1. Explain the process of organic matter decomposition on the forest floor.
2. Identify and explain important principles of fertilizer application.
3. Explain ways in which wood quality in a forest stand is altered as a result of fertilizer application.
4. Why should fertilizer high in phosphorous be used at the time of planting?
5. One example of a mixed fertilizer is 10-52-10. Explain what these numbers mean? What purpose would this fertilizer be most suited to?
6. Suggest fertilizers appropriate to three different stages of forest growth.
e.g., seedling establishment
after crown closure
10 to 15 years before harvest

SITE PREPARATION	
<i>The student:</i>	
☐	lists six or more objectives of site preparation
☐	explains techniques and applications of mechanical site preparation; e.g.: ☐ scalping ☐ trenching ☐ plowing mixing ☐ mounding
☐	identifies and describes common types of equipment used in mechanical site preparation; e.g.: ☐ blade ☐ plow ☐ drag scarifier ☐ disc trencher ☐ spot scarifier ☐ mower/inverter
☐	demonstrates techniques and applications of manual and motor manual site preparation
☐	explains applications of fire and herbicides in site preparation
☐	identifies geographic areas not suited to site preparation and explains why
☐	assesses three or more site preparation methods relative to site location

CONE COLLECTION AND SEED EXTRACTION	
<i>The student:</i>	
☐	identifies and describes common methods of cone collection; e.g.: ☐ squirrel caches ☐ felling and picking ☐ aerial collection
☐	identifies appropriate equipment and safe techniques for one or more methods of cone collection
☐	describes handling, tagging and temporary storage procedures for collected cones
☐	demonstrates seed extraction and seed cleaning techniques
☐	conducts one or more seed tests; e.g.: ☐ purity ☐ weight ☐ germination ☐ moisture content ☐ viability
☐	describes methods of seed storage
☐	

DIRECT SEEDING	
<i>The student:</i>	
☐	describes characteristics of a favourable seed bed; e.g.: ☐ physical nature of the forest floor ☐ kind and amount of vegetation
☐	describes techniques and applications of direct seeding; e.g.: ☐ broadcast seeding ☐ spot seeding
☐	identifies and describes common types of equipment used in direct seeding
☐	outlines steps that can be taken to enhance success with direct seeding; e.g.: ☐ timing the seeding operation ☐ preparing the seed bed ☐ managing seed quality and quantity ☐ controlling seed predators
☐	
☐	

PLANTING STOCK	
<i>The student:</i>	☐ demonstrates correct techniques for the care and handling of bare root and container stock; e.g.: ☐ physical handling ☐ temperature control ☐ moisture/humidity control ☐ demonstrates three or more hand-planting methods; e.g.: ☐ L-slit method ☐ mattock method ☐ planting bar method ☐ wedge method ☐ identifies and describes common hand-planting tools and equipment; e.g.: ☐ planting spade ☐ dibble ☐ planting bar ☐ pottiputki ☐ mattock ☐ demonstrates correct planting technique; e.g.: ☐ cleans out planting spot before making hole ☐ keeps roots of planting stock moist at all times, taking plants out of planting bag one at a time ☐ makes hole large and deep enough to ensure proper placement of roots ☐ plants firmly in ground to correct depth and within 30% of vertical ☐ closes hole from bottom to top, packing soil firmly against roots to prevent air pockets ☐ performs final check by gently tugging on plant

SPACING AND THINNING	
<i>The student:</i>	☐ identifies optimum spacing and stocking rates for one or more species of seedlings ☐ describes generally accepted rules of thumb for scheduling spacing and thinning treatments of crop trees ☐ describes applications of three or more thinning treatments; e.g.: ☐ juvenile spacing ☐ sanitation spacing ☐ conifer release ☐ commercial thinning ☐ establishes criteria for identifying trees to keep and trees to cut in a forest stand ☐ inspects crop trees for damage; e.g.: ☐ broken stems ☐ saw nicks ☐ broken leaders ☐ stripped limbs ☐ selects dominant and codominant trees to be saved as crop trees in a forest stand ☐ describes two or more thinning treatments; e.g.: ☐ cutting with brush saws/chain saws ☐ girdling ☐ hand pulling ☐ use of herbicides

PRUNING AND SANITATION	
<i>The student:</i>	☐ identifies reasons for artificial pruning ☐ describes factors that determine the timing of pruning operations ☐ identifies criteria for selecting crop trees to be pruned; e.g.: ☐ species characteristics ☐ growth rate ☐ number, size and age of trees ☐ demonstrates correct pruning technique; e.g.: ☐ live crown ratio greater than 40% ☐ proper pruning height ☐ branch cuts flush with bole ☐ identifies and describes common pruning tools and equipment; e.g.: ☐ hand and pole saws ☐ axes, brushhooks and hatchets ☐ chisels and pulling knives ☐ machines ☐ inspects residuals in a forest stand for: ☐ signs of damage ☐ quality of stems ☐ verifies that slash in a forest stand is bucked to lay flat on the ground ☐

STANDARD IS 2 IN EACH APPLICABLE TASK

Rating Scale

The student:

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

REFLECTIONS/COMMENTS

TASK	OBSERVATION/RATING				
Preparation and Planning	4	3	2	1	0
Information Gathering and Processing	4	3	2	1	0
Content	4	3	2	1	0
Collaboration and Teamwork	4	3	2	1	0
Information Sharing	4	3	2	1	0

STANDARD IS 3 IN EACH APPLICABLE TASK**Rating Scale***The student:*

- 4 exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.
- 3 meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.
- 2 meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.
- 1 meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.
- 0 has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

N/A Not Applicable

Assessment Tools

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TASK CHECKLIST*The student:***Preparation and Planning**

- ☐ sets clear goals and establishes steps to achieve them
- ☐ creates and adheres to detailed timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively, prioritizing tasks on a consistent basis

Information Gathering and Processing

- ☐ accesses a range of relevant information sources and recognizes when additional information is required
- ☐ demonstrates resourcefulness in collecting data
- ☐ interprets, organizes and combines information in creative and thoughtful ways
- ☐ records information accurately with appropriate supporting detail and using correct technical terms
- ☐ recognizes underlying bias/assumptions/values in information sources
- ☐ assesses and refines approach to the task and project status based on feedback and reflection

Content

- ☐ explains factors relevant to choosing a suitable method of harvest:
 - silvics of tree species
 - intended utilization
 - impact on wildlife and watershed
 - impact on other stakeholder groups
- ☐ provides a descriptive account and explains advantages/disadvantages of the:
 - clearcutting system of harvest
 - seed tree system of harvest

Content (continued)

- shelterwood system of harvest
- selection system of harvest
- ☐ makes recommendations (based on silvics) regarding an appropriate harvest method for each of seven Alberta tree species
- ☐ identifies social, economic and environmental factors that may influence harvest methods
- ☐ explains modifications to harvest systems that accommodate local site conditions and management objectives; e.g.:
 - clearcutting with reserves
 - forest ecosystem networks
 - single-tree selection

Collaboration and Teamwork

- ☐ cooperates with group members
- ☐ shares work appropriately among group members
- ☐ negotiates with sensitivity solutions to problems
- ☐ displays effective communication and leadership skills

Information Sharing

- ☐ demonstrates effective use of a variety of communication media; e.g., *written, oral, audio-visual*
- ☐ communicates thoughts/feelings/ideas clearly to justify or challenge a position
- ☐ maintains acceptable grammatical and technical standards
- ☐ gives evidence of adequate information gathering by citing seven or more relevant information sources

REFLECTIONS/COMMENTS:

Assessment Criteria and Conditions:

- definitions and Alberta examples of sustainable development, sustained yield, integrated land use and multiple use management.

Suggested Reference(s):

- *Our Growing Resource*
- *Alberta's Focus on Forests*
- *Managing the Forest*

STANDARD: Respond to a standard of 3 on the rating scale.

Rating Scale

The student:

- 4 meets project/task objectives in a self-directed manner. Provides explanations and critical judgements based on a superior knowledge base. Demonstrates an understanding of relevant concepts and related issues.
- 3 meets project/task objectives in a self-directed manner. Provides explanations and comparisons of relevant concepts using more precise terminology. Requires little or no prompting.
- 2 meets project/task objectives with limited assistance in planning and in selecting and using resources. Applies knowledge of concepts in different situations using correct terminology. Requires occasional prompting.
- 1 completes task as directed, demonstrating basic skills/completeness by following a guided course of action. Uses simple recall to demonstrate basic knowledge of concepts. Requires prompting.
- 0 does not complete the task, or is unable to provide a suitable response.

N/A Not Applicable

Background Information	Sample Questions/Activities
<p>See <i>Our Growing Resource</i>, Chapter 2 -- The Challenge of Sustainable Development:</p> <ul style="list-style-type: none"> • Managing Forest Development • Integrated Resource Management -- Accommodating Many Uses • Harvest Planning and Practices • Reforestation • Air and Water Quality • Building Sustainable Businesses. <p>See <i>Alberta's Focus on Forests</i>, Unit 5 -- Forest Management for All:</p> <ul style="list-style-type: none"> • 5.1: Forest Values • 5.2: Decision for Change • 5.3: Forest Perspectives • 5.4: Reforestation: Forests or Tree Farms? • 5.5: Integrated Resource Management. 	<ol style="list-style-type: none"> 1. Explain the goals of "sustainable development" and "sustainable yield" within the context of Alberta's forests. 2. Interpret and discuss the meaning of the following definition of sustainable forest management: "the development of forests to meet current needs without prejudice to their future productivity, ecological diversity, or capacity for regeneration." 3. Identify and explain major components/considerations relevant to sustainable forest management; e.g.: <ul style="list-style-type: none"> – timber resources – biodiversity of wildlife – air, land and water quality. 4. Explain why forests can and should serve many purposes. 5. Compare principles of integrated land use with principles of multiple use management by citing examples of each within Alberta. 6. Explain strategies for consultation and public involvement in forest management decisions in Alberta.

MANAGEMENT OUTCOMES

The student:

- ☐ identifies short- and long-term management goals for the area based on single use of the forest (e.g., recreation)
- ☐ justifies management goals as the preferred alternative for the area
- ☐ proposes a management plan for the area consistent with management goals that includes:
 - a statement of government policies and guidelines
 - a schedule of management activities
 - a process for public involvement
 - a strategy for monitoring use and resolving potential conflicts
- ☐ presents the management plan to class/peers in a logical sequence, supporting points with sound evidence
- ☐ identifies significant features of management plans presented by class/peers for the same area based on other types of forest use (e.g., wildlife habitat, wood fibre)
- ☐ negotiates with class/peers a set of compromised management goals and strategies for the area that support integrated land use (e.g., lumber, recreation, wildlife, gas, grazing) based on social, economic and environmental factors
- ☐ presents an integrated management plan for the forested area consistent with compromised management goals and strategies that attempts to address:
 - the views of relevant stakeholder groups
 - short- and long-term goals and objectives
 - proposed management standards and guidelines
 - a process for public involvement
 - a strategy for monitoring use and resolving potential conflicts.

PLANNING PROCESSES

Planning and Preparation

- ☐ sets goals and establishes steps to achieve them
- ☐ creates and adheres to useful timelines
- ☐ uses personal initiative to formulate questions and find answers
- ☐ plans and uses time effectively

Information Gathering and Processing

- ☐ accesses a variety of relevant information sources
- ☐ interprets, organizes and combines information in effective ways
- ☐ uses appropriate methods to calculate data and obtain accurate results

Collaboration and Teamwork

- ☐ cooperates with and shares work appropriately among team members
- ☐ shares information/opinions/suggestions, maintaining a balance between speaking and listening
- ☐ considers the ideas and suggestions of others, and when appropriate integrates new ideas into personal frame of reference

Negotiating and Debating

- ☐ explains positions adopted by presenting examples of possible consequences and implications
- ☐ presents a realistic plan in logical sequence supporting positions adopted
- ☐ provides a relevant and convincing rebuttal to opposing views
- ☐ negotiates solutions to problems and shared agreements by resolving divergent points of view

RATING SCALE

4	3	2	1	0
Exceeds defined outcomes. Plans and solves problems effectively and creatively in a self-directed manner. Tools, materials and/or processes are selected and used efficiently, effectively and with confidence.	Meets defined outcomes. Plans and solves problems in a self-directed manner. Tools, materials and/or processes are selected and used efficiently and effectively.	Meets defined outcomes. Plans and solves problems with limited assistance. Tools, materials and/or processes are selected and used appropriately.	Meets defined outcomes. Follows a guided plan of action. A limited range of tools, materials and/or processes are used appropriately.	Has not completed defined outcomes. Tools, materials and/or processes are used inappropriately.

STANDARD IS 2 IN MANAGEMENT OUTCOMES AND PLANNING PROCESSES

FORESTRY

SECTION H: LINKAGES/TRANSITIONS

This section of the Guide has been designed to provide an overview of linkages and transitions of CTS modules with a number of organizations. The charts and information presented in this section will assist CTS students and teachers in understanding the potential application of CTS modules as students move into the workplace.

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LINKAGES/TRANSITIONS

LINKAGES

With Other CTS Strands

The Forestry strand provides opportunities for students to develop competencies in one or more forestry-related areas, including:

- personal and/or recreational use
- silviculture
- forest inventory
- forest harvest
- forest products
- forest management.

Each area of forestry links with competencies that are developed in other CTS strands. To facilitate and strengthen these linkages, courses may be designed by combining Forestry modules with modules from other CTS strands (e.g., Agriculture, Community Health, Energy and Mines, Legal Studies, Management and Marketing, Mechanics, Tourism Studies, Wildlife).

Linkages of particular relevance to the design of CTS courses in Forestry include:

Strand	Themes and/or Modules
Career Transitions	Project modules provide opportunities for learning beyond the expectations of given Forestry modules. Practicum modules enable students to work toward obtaining credentials in recognized in the workplace/community. Safety modules provide opportunities to address safety skills relevant to specific sectors of the forest industry. Leadership modules have application in a range of group activities conducted in wilderness/forest environments.
Community Health	Modules within the “Injury Prevention” theme link with a range of workplace competencies developed within the Forestry strand.

Strand	Themes and/or Modules
Legal Studies	Modules within the “Societal Contexts” theme (e.g., Environmental Law, Dispute Resolution, Landmark Decisions) can be contextualized within a forest industry.
Mechanics	Modules within the “Propulsion Systems” and “Guidance and Control Systems” themes can be contextualized within specific forest industry operations (e.g., maintenance of power driven machines).
Tourism Studies	Modules within the “Attractions” theme can be contextualized within a specific forest environment (e.g., outdoor adventure, ecotourism).
Wildlife	Modules within the “Management and Conservation” theme complement the study of forest ecology and forest management practices.

It is important to note that the project, practicum and safety modules in Career Transitions may be combined with Forestry modules to provide opportunities for students to:

- acquire safety competencies and credentials
- develop specific workplace skills
- expand upon a topic in a module or theme
- complete an investigation, project or service.

Additional information regarding connections with other CTS strands is provided in this section (see “Connections with Other CTS Strands”).

Sample courses in Forestry that include modules from other CTS strands are also provided in this section (see “Forestry in Junior High” and “Forestry in Senior High”).

With Other Secondary Programs

The Forestry strand has many links with other core and complementary subject areas across the curriculum. For example, many of the modules in Forestry link with the junior and senior high science programs, and provide opportunities for students to extend and apply related knowledge and skills in practical ways. Modules in the Forestry strand also link with topics developed in the complementary junior high Environmental and Outdoor Education program.

Core and complementary course linkages of particular relevance to CTS courses in Forestry include:

Course/ Program Area	Linkage/Connection
Language Arts	Application of the research process; development of reporting and oral/multimedia presentation skills within a range of industry contexts.
Mathematics	Application of number operations, variables and equations, measurement (i.e., length, area, volume), statistics and probability within the context of forest inventory and sampling practices.
Science	Use of observation and experimentation; knowledge and theory of relevant topics in biology, ecology and earth science; analysis of relationships among science, technology, society and the environment.
Social Studies	Knowledge of the impact of social, economic and environmental perspectives on forests; issue analysis, negotiation, debate and environmental citizenship within a range of industry contexts.
Physical Education	Application of personal fitness and outdoor survival skills to excursions in a forest environment.
Fine Arts	Knowledge and awareness of the significance of forests and outdoor environments in art, music and drama.

Course/ Program Area	Linkage/Connection
Environmental and Outdoor Education	Application of outdoor and personal/group skills to activities conducted in forest environments; application of environmental knowledge/skills to forest ecology, silviculture practices and resource management.
CALM	Awareness of career opportunities and trends; career research and preparation.

Additional information regarding connections between Forestry modules and other core and complementary subject areas is provided in this section (see “Forestry: Connections Across the Curriculum”).

A detailed correlation of the Forestry strand to the Environmental and Outdoor Education program is also provided in this section (see “Forestry: Correlations with Environmental and Outdoor Education 7, 8 and 9”).

TRANSITIONS

To the Workplace

Intermediate and advanced modules are designed to develop knowledge, skills and attitudes that provide transitions to occupations in forestry-related areas. Some career sectors welcome individuals who have basic skills and are prepared to learn through further training from the employer.

The National Occupational Classification (NOC) chart in this section indicates occupations for which the Forestry strand provides a foundation (see “Forestry: Related Occupations”).

To Related Post-secondary Programs

Advanced level modules will assist students to make plans regarding further studies in forestry at post-secondary levels. The Forestry modules provide desirable background and skills for entry into related programs at public and private colleges, technical institutes, universities and vocational colleges in Alberta.

A summary of related programs currently offered at post-secondary institutions in Alberta is provided in this section (see “Forestry: Summary of Related Post-Secondary Programs”).

A number of articulation agreements have been established with post-secondary institutions in Alberta. These agreements provide preferred entrance and/or advanced standing/credit for CTS students who have successfully completed designated courses. A current summary of articulation agreements in place that involve CTS courses is available through the provincial web site. For further information regarding particular articulation agreements, contact the post-secondary institution and/or review its respective calendar.

Further information regarding these and other credentialling opportunities available to CTS students is provided in the *Career & Technology Studies Manual for Administrators, Counsellors and Teachers* (see Appendix 5: Planning Ahead—CTS Transitions into Post-secondary Programs and the Workplace), and also through the provincial web site.

CREDENTIALLING

Students may earn partial or complete credentials recognized in the workplace and/or post-secondary institutions by demonstrating specified competencies within the CTS curriculum. The Forestry strand, in conjunction with courses from the Career Transitions strand, provides opportunities for students to develop competencies that link with a number of credentialling programs.

Of particular significance are credentials available through:

- First Aid certificate courses
- Alberta Safety Council programs
- Alberta Tourism Education Council (ATEC) programs.

Teachers may wish to explore opportunities for linking courses in Forestry with these and/or other credentialling programs. A partial list of credentialling opportunities relevant to CTS courses in Forestry is provided in this section (see “Credentialling Opportunities in Forestry”).

LINKAGES – Forestry: Connections with Other CTS Strands

Forestry Courses	Other CTS Strands															
	Agriculture	Career Transitions	Communication Technology	Community Health	Construction Technologies	Cosmetology Studies	Design Studies	Energy and Mines	Electro-Technologies	Enterprise and Innovation	Fashion Studies	Financial Management	Foods	Fabrication Studies	Information Processing	Legal Studies
Theme: Social and Cultural Perspectives																
FOR1010: Why Forestry?																
FOR1020: Forest Regions of Canada																
WLD1030: Outdoor Experiences 1																
FOR2010: Making a Difference																
FOR2030: Managing Alberta Forests																
WLD2030: Outdoor Experiences 2																
FOR3010: Issues in Forestry																
Theme: Technology and Applications																
FOR1050: Mapping & Aerial Photos																
FOR1060: Measuring the Forest 1																
FOR2060: Measuring the Forest 2																
FOR2070: Harvest Practices																
FOR3060: Measuring the Forest 3																
FOR3070: The Forest Marketplace																
FOR3080: Forest Technology Applications																
Theme: Management and Conservation																
FOR1090: Forest Ecology 1																
FOR1100: Forests Forever 1																
FOR2100: Forests Forever 2																
FOR2120: Users in the Forest																
FOR3090: Forest Ecology 2																
FOR3110: Silviculture																
FOR3120: Integrated Resource Management																

Provides many direct links with competencies in this strand. Students will reinforce, extend and apply a substantial number of knowledge and/or skill components in practical situations.

Provides some links with competencies developed in this strand, usually through the application of related technologies and/or processes.

LINKAGES – Forestry in Junior High

Course Emphasis	Forestry Courses	Mechanics Courses	Wildlife Courses	Tourism Studies Courses
Forest Ecology (3 courses)	Why Forestry? <i>FOR1010</i>		Natural History of Wildlife <i>WLD1020</i>	
	Forest Ecology 1 <i>FOR1090</i>			
Forest Inventory (4 courses)	Why Forestry? <i>FOR1010</i>		Measuring the Value <i>WLD2020</i>	
	Mapping & Aerial Photos <i>FOR1050</i>			
	Measuring the Forest 1 <i>FOR1060</i>			
Logging and Timber Utilization (5 courses)	Why Forestry? <i>FOR1010</i>	Engine Fundamentals <i>MEC1040</i>		
	Forest Regions of Canada <i>FOR1020</i>	Mechanical Systems <i>MEC1130</i>		
	Harvest Practices <i>FOR2070</i>			
Personal and Recreational Use (6 courses)	Why Forestry? <i>FOR1010</i>		Angling & Fish Management <i>WLD1080</i>	The Attractions Sector <i>TOU1070</i>
	Mapping & Aerial Photos <i>FOR1050</i>		Outdoor Experiences 1 <i>WLD1030</i>	
			Outdoor Experiences 2 <i>WLD2030</i>	

LINKAGES – Forestry in Senior High

Course Emphasis	Forestry Courses	Wildlife Courses	Tourism Studies Courses	Career Transitions Courses
Personal and Recreational (3 credits) Prerequisite: Outdoor Experiences 1	Making a Difference <i>FOR2010</i>	Outdoor Experiences 2 <i>WLD2030</i>	Adventure & Ecotourism <i>TOU3110</i>	
Silviculture (5 credits) Prerequisite: None	Forest Ecology 1 <i>FOR1090</i> Forest Ecology 2 <i>FOR3090</i> Silviculture <i>FOR3110</i> Forest Technology Applications <i>FOR3080</i>			Project 2A <i>CTR2110</i>
Harvest and Forest Products (5 credits) Prerequisite: Measuring the Forest 1 and 2	Managing Alberta Forests <i>FOR2030</i> Harvest Practices <i>FOR2070</i> The Forest Marketplace <i>FOR3070</i> Measuring the Forest 3 <i>FOR3060</i>			Project 2A <i>CTR2110</i>
Environmental Stewardship (3 credits) Prerequisite: None	Making a Difference <i>FOR2010</i>	Issues in Wildlife 1 <i>WLD2090</i>		Project 2A <i>CTR2110</i>
Forest Management (5 credits) Prerequisite: None	Issues in Forestry <i>FOR3010</i> Users in the Forest <i>FOR2120</i> Integrated Resource Management <i>FOR3120</i>	Interactions <i>WLD2060</i>		Project 2A <i>CTR2110</i>

LINKAGES – Forestry: Connections Across the Curriculum

Forestry Courses	Across the Curriculum																
	Junior High							Senior High									
	Language Arts	Social Studies	Mathematics	Science	Health & PLS	Physical Education	Fine Arts	English	Social Studies	Mathematics	Science (General)	Biology	Chemistry	Physics	CALM	Physical Education	Fine Arts
Theme: Social and Cultural Perspectives																	
FOR1010: Why Forestry?																	
FOR1020: Forest Regions of Canada																	
WLD1030: Outdoor Experiences 1																	
FOR2010: Making a Difference																	
FOR2030: Managing Alberta Forests																	
WLD2030: Outdoor Experiences 2																	
FOR3010: Issues in Forestry																	
Theme: Technology and Applications																	
FOR1050: Mapping & Aerial Photos																	
FOR1060: Measuring the Forest 1																	
FOR2060: Measuring the Forest 2																	
FOR2070: Harvesting Practices																	
FOR3060: Measuring the Forest 3																	
FOR3070: The Forest Marketplace																	
FOR3080: Forest Technology Applications																	
Theme: Management and Conservation																	
FOR1090: Forest Ecology 1																	
FOR1100: Forests Forever 1																	
FOR2100: Forests Forever 2																	
FOR2120: Users in the Forest																	
FOR3090: Forest Ecology 2																	
FOR3110: Silviculture																	
FOR3120: Integrated Resource Management																	

Provides many direct links with course content. Students will reinforce, extend and apply a substantial number of knowledge and/or skill components in practical contexts.

Provides some links with course content, usually through the application of related technologies and/or processes.

LINKAGES – Forestry: Correlations with Environmental and Outdoor Education 7, 8 and 9 ★

Themes/Topics: Environmental and Outdoor Education	CTS Courses: Forestry																				
	Why Forestry? FOR 1010	Forest Regions of Canada FOR 1020	Outdoor Experiences 1 WLD 1030	Mapping & Aerial Photos FOR 1050	Measuring the Forest 1 FOR 1060	Forest Ecology 1 FOR 1090	Forests Forever 1 FOR 1100	Making a Difference FOR 2010	Managing Alberta Forests FOR 2030	Outdoor Experiences 2 WLD 2030	Measuring the Forest 2 FOR 2060	Harvest Practices FOR 2070	Forests Forever 2 FOR 2100	Users in the Forest FOR 2120	Issues in Forestry FOR 3010	Measuring the Forest 3 FOR 3060	The Forest Marketplace FOR 3070	Forest Technology Applications FOR 3080	Forest Ecology 2 FOR 3090	Silviculture FOR 3110	Integrated Resource Management FOR 3120
OUTDOOR CORE																					
Regard for self, others and the environment			X	X	X					X	X					X					
Trip preparation and safety			X							X											
Safe and comfortable outdoor living skills			X							X											
Applying information for safe route planning			X	X						X											
Environmentally responsible outdoor activities			X		X					X	X					X				X	
Physical fitness for outdoor activities																					
PERSONAL AND GROUP DEVELOPMENT																					
Respect and appreciation for self and others	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Setting realistic goals	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Personal communication skills	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Relationship of individuals to groups	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Group process skills	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ENVIRONMENTAL CORE																					
Diversity of environments and life forms	X	X				X													X		
Interactions within environments	X	X				X													X	X	
Natural and human changes to the environment	X					X	X						X		X				X		
Air, water and soil cycles	X					X													X	X	
The sun as the primary energy source on Earth						X													X		
OUTDOOR EXPEDITIONS																					
Skill and judgement in outdoor expeditions			X	X	X					X	X					X				X	
Positive self-concept and regard for others			X							X											
Group problem solving and group living skills			X							X											
Regard for environments and responsible outdoor judgement			X	X	X					X	X					X				X	
ENVIRONMENTAL INVESTIGATIONS																					
Environmental investigation skills		X				X													X	X	
Strategies for responding to environmental concerns							X	X					X		X						X
COMMITMENT TO ACTION																					
Outdoor recreation as part of healthy lifestyle			X							X											
Appreciation of environments through respectful use	X		X				X	X		X			X		X						X
Responsible use of local and global environments	X		X				X	X		X			X		X						X
Plans to make personal growth a lifelong process								X							X						

★ September 1997: All practical arts courses replaced by Career and Technology Studies.

TRANSITIONS – Forestry: Related Occupations

Information for this chart was obtained from the National Occupational Classification (NOC) descriptions.

Educational Requirements:

D: High School Education

B: College or Vocational Education

C: Apprenticeship

A: University

STRAND-RELATED OCCUPATIONS		EDUCATION REQUIREMENTS			
Occupation Profile	NOC#	D	C	B	A
Arborist	2225			✓	✓
Biochemist	2112				✓
Biologist and Related Scientist	2121				✓
Botanist	2121				✓
Chemist	2112				✓
Chainsaw and Skidder Operators	8421	✓			
Environmental Auditor	2263				✓
Environmental Education Specialist	4161				✓
Environmental Engineer	2131				✓
Forest Technologist	2223			✓	
Forester/Forestry Scientist	2122				✓
Forestry Professionals	2122				✓
Forestry Worker	8422			✓	
Hazardous Waste Management Technician	2263			✓	
Hydrologist	2113				✓
Inspectors in Public and Environmental Health and Occupational Health and Safety	2263			✓	✓
Interpretive Naturalist	2121			✓	✓
Labourers in Wood, Pulp and Paper Processing	9614	✓			
Land Surveyor	2154				✓
Land Use/Community Planner (Urban, Regional, Park)	2153				✓
Logging and Forestry Labourers	8616	✓			
Logging Machinery Operators	8241	✓			
Lumber Graders and Other Wood Processing Inspectors and Graders	9436	✓			
Other Wood Processing Machine Operators	9434	✓			
Paper Converting Machine Operators	9435	✓			
Papermaking and Coating Control Operators	9234	✓			
Papermaking and Finishing Machine Operators	9433	✓			
Pollution Control Technician	2231			✓	
Pulp Mill Machine Operators	9432	✓		✓	
Pulping Control Operators	9233	✓		✓	
Primary Production Managers (except Agriculture)	0911				✓
Sawmill Machine Operators	9431	✓			
Silviculture and Forestry Workers	8422	✓		✓	
Supervisors, Forest Products Processing	9215	✓		✓	
Supervisor, Logging and Forestry	8211	✓		✓	
Utilities Managers	0912			✓	✓

LINKAGES – Forestry: Summary of Post-secondary Programs

	PUBLIC COLLEGES									APPRENTICESHIP TRADE				PRIVATE COLLEGES					TECH. INST.		UNIVERSITIES		VOCATIONAL COLLEGES					
	Alberta College of Art & Design	Fairview College	Grande Prairie Regional College	Grant MacEwan Community College	Keyano College	Lakeland College	Lethbridge Community College	Medicine Hat College	Mount Royal College	Olds College	Red Deer College	Alberta College	Augustana University College	Canadian Union College	Concordia College	King's University College, The	North American Baptist College	Northern Alberta Institute of Technology	Southern Alberta Institute of Technology	Banff Centre	Athabasca University	University of Alberta	University of Calgary	University of Lethbridge	AVC - Calgary	AVC - Edmonton	AVC - Lac La Biche	AVC - Lesser Slave Lake
Biological Sciences (including degree programs in Biochemistry, Biology, Botany, Entomology, Genetics, Microbiology & Zoology)			1t2t	2t	1t	1t		1t2t	2t		2t		B	B	B	B						BMP hD	BMP hD	BM				
Biological Sciences/Biomedical Engineering Technology (certificate & diploma programs with various specializations)										1t								D										
Environmental Science (various specializations in Conservation & Reclamation, Environmental Monitoring & Conservation Enforcement, Fish & Wildlife, Parks & Recreation, and Renewable Resource/Watershed Management)					1t	D	CD			CD					B2t	B	D			V		B	CM	B				C(34 w)
Environmental Technology/Water & Wastewater Technician									CD								C											C
Forestry, Forest Science/Technology		1t			1t	1t		1t	1t		1t		1t				D					BMP hD		1t				C
Forest/Logging Operations																		V	V							C	VC	
Petroleum/Mineral Resource/Land Management										D																		
Leisure, Tourism & Society/ Recreation											2t				1t							BM	B	BM				
Administration/Leisure (degree programs with various specializations)					C			1t				1t										BM	BM	BM				
Physical Education (degree programs with various specializations)		2t	1t		1t	1t		2t	D1t	2t	2t		B	2t	1t							BMP hD	BM	BM				
Recreation, Leadership & Management/Leisure Services (certificate and diploma programs with various specializations)					CD	D	D		D										D								C	C

CODES:	B	Bachelor's Degree	D	Diploma (2 years)	w	weeks
	M	Master's Degree	V	Varies	m	months
	Ph.D.	Doctoral Degree	1t	One-year transfer	y	years
	C	Certificate (1 year or less)	2t	Two-year transfer		

*Information taken from "It's About Time: To Start Thinking About Your Future," Advanced Education and Career Development, 1995.

CREDENTIALLING – *Credentialling Opportunities in Forestry*

The following credentialling opportunities link with courses in the Forestry strand. Further information (including current contacts) for these and other credentialling opportunities available to CTS students is available through the provincial web site.

Credential/Certificate	Training/ Credentialling Agency	Related CTS Strands/Courses	Program Description
All Terrain Vehicle Rider	Alberta Safety Council	FOR2120: Users in the Forest FOR3120: Integrated Resource Management CTR3040–3080: Practicum Courses	An industry-based credentialling program that offers certification in ATV use for recreational or industrial purposes. Deals with pre-ride inspection, range signals, rules and warm-up exercises, riding strategies, circles, turns, stops and traversing hills. Certificates are issued upon successful completion of an examination.
Bear Awareness and Avoidance: • Basic • Advanced	Alberta Safety Council	WLD1030: Outdoor Experiences 1 FOR2030: Outdoor Experiences 2 FOR1060: Measuring the Forest 1 FOR2060: Measuring the Forest 2 CTR3040–3080: Practicum Courses CTR2210: Workplace Safety	A safety awareness program that offer certification at two levels. Each course deals with species recognition and bear biology, bear behaviour, avoiding bear problems and bear deterrents. Certificates are issued upon successful completion of an examination.
First Aid in the Wilderness	St. John Ambulance	WLD1030: Outdoor Experiences 1 WLD2030: Outdoor Experiences 2 FOR1060: Measuring the Forest 1 FOR2060: Measuring the Forest 2 CTR3040–3080: Practicum Courses CTR2210: Workplace Safety	A credentialling program designed for individuals who work, live or play in wilderness or remote areas. Deals with how to cope with emergencies and provide first aid in remote settings where medical services are not available. Certificates are issued upon successful completion of an examination.
Canadian Tourism Industry Certification: • Outdoor Guide • Freshwater Angling Guide • Hunting Guide	Alberta Tourism Education Council	WLD1030: Outdoor Experiences 1 WLD2030: Outdoor Experiences 2 CTR3040–3080: Practicum Courses	Industry-based certification programs that address standards established by the tourism industry. Certificates are awarded to individuals who demonstrate occupational standards through written and practical testing.

SECTION I: LEARNING RESOURCE GUIDE

This section of the GSI explains how to obtain up-to-date information regarding learning resources that have been identified to support the delivery of courses in this strand. It provides directions for searching, by electronic means, the most current information on:

- authorized student basic, support and authorized teaching resources—resources approved by Alberta Learning for use in this strand
- provincial software agreements—licensing agreements that allow school jurisdictions to purchase educational software at significantly reduced prices
- additional sources of information—other titles and information sources that may provide potentially useful ideas for courses in this strand.

The resource listings compiled for this strand are time sensitive and subject to change. Teachers are encouraged to browse the web sites identified in this guide on a regular basis for the most up-to-date information on new learning resources, more recent versions/editions and other sources of support.

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NOTICE

SECTION I: LEARNING RESOURCE GUIDE

Alberta Learning authorizes a variety of resources that support learning and teaching in this strand. The 1999 amendments to Section I provide directions for obtaining, by electronic means, up-to-date information about authorized resources and other sources of information.

Teachers are encouraged to browse the web sites identified in this guide on a regular basis for the most up-to-date information on:

- authorized resources; i.e., student basic, support, and authorized teaching
- provincial software licensing agreements
- additional sources of support.

The lists of authorized resources that were previously included in Section I have been removed from the 1999 amendments to this document. From 1999 onward, up-to-date listings of authorized resources are to be accessed through:

- the Learning Resources Distributing Centre *Buyers Guide*, available electronically at <<http://ednet.edc.gov.ab.ca/lrdc>>
- the Authorized Resources Database, available electronically at <<http://ednet.edc.gov.ab.ca>> under Students and Learning, Learning and Teaching Resources.

Subsequent amendments to the *Guide to Standards and Implementation* for other CTS strands will include similar changes to Section I.

LEARNING RESOURCE GUIDE

This section of the guide provides directions for obtaining, from electronic sources, up-to-date information about learning resources that support the delivery of CTS courses in this strand. Teachers may use the information to search for current listings of:

- authorized resources that support learning and teaching
 - basic learning resources
 - support learning resources
 - authorized teaching resources
- provincial software licensing agreements
- additional sources of information
 - other titles and sources that contain potentially useful information and ideas
 - web sites that may provide access to global networks of information.

Learning resources for this strand will continue to be updated in order to maintain and expand access to current information suitable for use in a variety of CTS learning environments.

CTS AND THE RESOURCE-BASED CLASSROOM

CTS supports the development of resource-based classrooms where a variety of appropriate, up-to-date print and nonprint resources are available. This approach enables students to:

- interact with a wide range of information sources
- access and use information sources appropriately
- take an active role in managing their own learning.

CTS identifies learning resources in print, software, video and CDROM formats, as well as other sources of information available in the community and through the Internet.

Collaboration between the teacher-librarian and CTS teacher in planning resource-based research activities will ensure that students develop research skills as they increase their understanding of subject content. Planned and purposeful research activities will help students learn to

gather, process and share information, and will require access to a range of current print and nonprint resources available in the school library, other libraries, the community and/or from other sources.

Teachers are encouraged to reference *Focus on Research: A Guide to Developing Students' Research Skills*, referenced in the Alberta Learning Monographs section of this guide, when planning research activities.

LEARNING RESOURCE POLICY

Alberta Learning authorizes resources considered appropriate for provincial programs of study and that have met criteria for acceptability. The authorized resources for CTS include:

- student basic—resources that address the majority of the learner outcomes in one or more CTS courses
- student support—resources that assist in addressing some of the learner outcomes of a CTS course
- authorized teaching—resources that support the implementation of one or more CTS courses and assist teachers in the instructional process.

The Learning Technologies Branch also has developed distance education materials for a number of CTS courses. These course materials, also authorized by the province of Alberta, include a range of print and electronic products that can be used to support teaching and learning in CTS.

School boards may identify and approve instructional materials for use in their schools under section 44 (2) of the *School Act*. Many school boards have delegated the power to approve resources to school staff or other board employees under section 45 (1) of the *School Act*.

For further information on resource policy and definitions, refer to the *Student Learning Resources Policy* and *Teaching Resources Policy* or contact:

Learning Resources Unit
Curriculum Standards Branch
Alberta Learning
5th Floor, Devonian Building, East Tower
11160 Jasper Avenue
Edmonton, AB, Canada T5K 0L2
Telephone: 780-422-4872 (to be connected toll free inside Alberta dial 310-0000)
Fax: 780-422-0576
Internet: <<http://ednet.edc.gov.ab.ca>>

HOW TO OBTAIN UP-TO-DATE INFORMATION

Authorized Resources

A searchable online index of all student basic, support and authorized teaching resources for courses in this CTS strand is provided through the Authorized Resources Database on the provincial web site. Each entry in the database provides bibliographic information about the resource, an annotation where appropriate, a correlation to specific one-credit courses in this strand, and information about how to obtain the resource.

The Authorized Resources Database can be accessed at <<http://ednet.edc.gov.ab.ca>>:

- click on "Students and Learning"
- select "Learning and Teaching Resources"
- then select the "Authorized Resources Database".

When using the database to search for resources within a particular CTS strand:

- enter the strand name as the "Curricular Area"
- select the desired "Format" and "Authorization Status" from the options provided
- click on "Submit".

The database begins each list of student basic, support and authorized teaching resources with those resources that been authorized most recently.

Upon first entering the database, the user is provided with a title and brief description of each resource, accompanied with copyright information, authorization status, number of pages and intended use by curriculum area and grades. Then by clicking on the "More" icon, a more detailed description of each resource can be obtained, along with additional information regarding publisher/distributor, physical appearance, cost, correlation to individual CTS courses, how to obtain the resource and where the resource can be previewed.

Up-to-date information regarding the availability of distance education materials for CTS courses (i.e., print products, electronic products, products in development) can also be obtained through the web site:

- click on "Students and Learning"
- select "Learning and Teaching Resources"
- then select the "Learning Technologies Branch".

Teachers are encouraged to browse the Authorized Resources Database and Learning Technologies Branch Homepage on a regular basis for the most up-to-date information on authorized learning resources and distance education course materials that are available.

Provincial Software Agreements

Due to frequent upgrades occurring in productivity software (e.g., software packages developed for word processing, spreadsheet, database, multimedia, drawing and design applications), this kind of software is no longer authorized by the department. However, a number of provincial licensing agreements for software products are in place that allow school jurisdictions to purchase productivity software at significantly reduced prices.

An up-to-date listing of provincial software agreements can be obtained through the "Technology" section of the web site. Teachers are encouraged to browse this listing on a regular basis for information regarding additional provincial software licensing agreements that may be established from time to time.

HOW TO ORDER AUTHORIZED RESOURCES

Most of the student basic, support and authorized teaching resources can be obtained from the Learning Resources Distributing Centre (LRDC). The LRDC *Buyer's Guide*, available in electronic or print formats, provides a complete listing of resources available for purchase and additional ordering information. The LRDC can be contacted at:

12360 – 142 Street
Edmonton, AB, Canada T5L 4X9
Telephone: 780-427-5775 (to be connected toll free inside Alberta dial 310-0000)
Fax: 780-422-9750
Internet: <<http://ednet.edc.gov.ab.ca/lrdc>>.

It is recommended that all resources be previewed prior to purchase. In some instances, teachers may find it desirable to purchase one copy for their reference and additional copies as required.

ADDITIONAL SOURCES OF INFORMATION

There are many additional sources of information—other titles, and information available from government, professional associations, industry organizations and community agencies—that may provide potentially useful ideas for courses in this strand. Of further note are a number of web sites relevant to courses in this strand, which when used effectively, can provide both teachers and learners with a global network of useable information.

The responsibility to evaluate these additional sources of information prior to selection rests with the user, in accordance with any existing local policy.

CTS Council

An online listing of additional sources of information relevant to courses in this strand is available on the CTS Council web site at <<http://ctscouncil.com>>. This site can be accessed through the CTS homepage by going to “Related Sites”.

Each entry in this listing includes the name of the resource or agency/organization, appropriate distributor/contact information, and where possible a description of the materials/services available.

The CTS Council welcomes your suggestions for maintaining and expanding the sources of information that are shared through this site.

Telus 2Learn Alliance

A searchable online listing of web sites containing information and materials relevant to courses in this strand is available through the Telus 2Learn Alliance at <<http://www.2Learn.ca>>. This site can also be accessed through the CTS homepage by going to “Related Sites”.

The Telus 2Learn Alliance welcomes your feedback and ideas on these and other sites relevant to courses in this strand.

OTHER SOURCES OF SUPPORT

ACCESS: The Education Station

ACCESS: The Education Station offers a variety of resources and services to teachers. For a nominal dubbing and tape fee, ACCESS: The Education Station will copy audiotapes and videotapes for teachers.

ACCESS: The Education Station publishes listings of audiocassettes and videocassettes as well as a comprehensive programming schedule. For further information, visit their web site at <<http://www.accessstv.ab.ca>>.

National Film Board of Canada

The National Film Board of Canada (NFB) has numerous audiovisual resources that may be suitable for use in CTS courses. While these resources can be ordered directly from the NFB, many of their materials are also available in public libraries.

For a list of NFB audiovisual resources indexed by title and subject, or to place an order for audiovisual resources, visit their web site at <http://www.nfb.ca>.

Media and Resource Centres

There are a number of urban media and regional resource centres across the province that provide on a loan basis instructional materials that may support CTS courses. Teachers are encouraged to contact their local media or resource centre for further information regarding services that are available.

Urban Media Centres

Calgary Board of Education
Calgary, AB, Canada
Web site: www.cbe.ab.ca

Calgary Separate School Board
Calgary, AB, Canada
Web site: www.crssd1.calgary.ab.ca

Edmonton Catholic School District
Edmonton, AB, Canada
Web site: www.ecs.edmonton.ab.ca

Edmonton Public School Board
Edmonton, AB, Canada
Web site: www.epsb.edmonton.ab.ca

Elk Island Public School Division
Sherwood Park, AB, Canada
Web site: www.ei.educ.ab.ca

Medicine Hat School District
Medicine Hat, AB, Canada
Web site: www.sd76.ab.ca

Northern Lights School Division
Spirit River, AB, Canada
Web site: www.nlsd.ab.ca

Red Deer Public School District
Red Deer, AB, Canada
Web site: www.rdpsd.ab.ca

Regional Resource Centres

Zone 1
Zone One Regional Resource Centre
Peace River, AB, Canada
Web site: (not yet available)

Zone 2/3
Central Alberta Media Services
Sherwood Park, AB, Canada
Web site: www.cams.ab.ca

Zone 4
Parkland Regional Library
Lacombe, AB, Canada
Web site: www.prl.lacombe.ab.ca

Zone 5
South Central Alberta Resource Centre
Strathmore, AB, Canada
Web site: (available in September 1999)

Zone 6
Southern Alberta Learning Resource Centre
Lethbridge, AB, Canada
Web site: (available in July 1999)

Alberta Learning Monographs

The following monographs are available for purchase from the Learning Resources Distributing Centre. Refer to the "Support Documents" section or the "Legal, Service and Information Publications" section in the LRDC *Buyers Guide* for ordering information and costs.

- *The Emerging Student: Relationships Among the Cognitive, Social and Physical Domains of Development*, 1991 (LRDC Product No. 161555)

This document examines the child, or student, as a productive learner, integrating all the domains of development: cognitive, social and physical. It emphasizes the need for providing balanced curriculum and instruction.

- *Students' Interactions Developmental Framework: The Social Sphere*, 1988 (LRDC Product No. 161399)

This document examines children's perceptual, structural and motor development and how such physical development affects certain learning processes.

- *Focus on Research: A Guide to Developing Students' Research Skills*, 1990 (LRDC Product No. 161802)

This document outlines a resource-based research model that helps students manage information effectively and efficiently, and gain skills that are transferable to school and work situations. This model provides a developmental approach to teaching students how to do research.

- *Teaching Thinking: Enhancing Learning*, 1990 (LRDC Product No. 161521)

Principles and guidelines for cultivating thinking, ECS to Grade 12, have been developed in this resource. It offers a definition of thinking, describes nine basic principles on which the suggested practices are based, and discusses possible procedures for implementation in schools and classrooms.

[The 1997 text was deleted September 1999.]

Note

*Effective September 1999,
pages I.9 to I.56 have been deleted
and not replaced.*

FORESTRY

SECTION J: SAMPLE STUDENT LEARNING GUIDES

The following pages provide background information, strategies and a template for developing student learning guides. Also included at the end of this section are several sample student learning guides for Forestry.

A student learning guide provides information and direction to help students attain the expectations defined in a specified CTS course. It is designed to be used by students under the direction of a teacher.

Many excellent student learning guides (SLGs) are available for use and/or are in the process of being developed. While Alberta Education provides a development template accompanied by some samples, most student learning guide development is being done by individuals and organizations across the province (e.g., school jurisdictions, specialist councils, post-secondary organizations).

Note: A student learning guide is not a self-contained learning package like those developed by the Learning Technologies Branch (LTB) or Distance Learning Options South (DLOS).

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(<i>deleted pages</i>).....	J.17-J.22
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BACKGROUND INFORMATION

A Student Learning Guide (SLG) is a presentation of information and direction that will help students attain the expectations defined in a specified CTS module. It is designed to be used by students under the direction of a teacher. A SLG is not a self-contained learning package such as you might receive from the Alberta Distance Learning Centre (ADLC) or Distance Learning Options South (DLOS).

Each SLG is based on curriculum and assessment standards as defined for a particular CTS module. Curriculum and assessment standards are defined in this document through:

- module and specific learner expectations (Sections D, E and F)
- assessment criteria and conditions (Sections D, E and F)
- assessment tools (Section G).

The SLG is written with the student in mind and makes sense to the student in the context of his or her CTS program. SLGs are designed to guide students through modules under the direction of the teacher. They can be used to guide:

- an entire class
- a small groups of students
- individual students.

In some instances, the Student Learning Guide may also be used as teacher lesson plans. When using SLGs as teacher lesson plans, it should be noted that they tend to be:

- learner-centred (versus teacher-directed)
- activity-based (versus lecture-based)
- resource-based (versus textbook-based).

Components of a Student Learning Guide

The student learning guide format, as developed by Alberta Education, typically has *seven* components as described below.

1. *Why Take This Module?*

This section provides a brief rationale for the work the student will do, and also establishes a context for learning (i.e., in relation to the strand, a life pursuit, a specific industry, etc.).

2. *What Do You Need To Know Before You Start?*

In this section, prerequisite knowledge, skills and attitudes considered necessary for success in the module are identified. Prerequisites may include other modules from within the strand or from related CTS strands, as well as generic knowledge and skills (e.g., safety competencies, the ability to measure/write/draw, prior knowledge of basic information relevant to the area of study).

3. *What Will You Know And Be Able To Do When You Finish?*

This information must parallel and reflect the curriculum and assessment standards as defined for the module. You may find it desirable to rewrite these standards in less formal language for student use.

4. *When Should Your Work Be Done?*

This section provides a timeline that will guide the student in planning their work. The timeline will need to reflect your program and be specific to the assignments you give your students. You may wish to include a time management chart, a list of all assignments to be completed, and instructions to the student regarding the use of a daily planner (i.e., agenda book) to organize their work.

5. *How Will Your Mark For This Module Be Determined?*

This section will interpret the assessment criteria and conditions, assessment standards, assessment tools and suggested emphasis as defined for the module within the context of the projects/tasks completed. Accepted grading practices will then be used to determine a percentage grade for the module—a mark not less than 50% for successful completion. (**Note:** A module is

“successfully completed” when the student can demonstrate ALL of the exit-level competencies or MLEs defined for the module.)

6. *Which Resources May You Use?*

Resources considered appropriate for completing the module and learning activities are identified in this section of the guide. The resources may be available through the Learning Resources Distributing Centre (LRDC) and/or through other agencies. Some SLGs may reference a single resource, while others may reference a range of resources. Resources may include those identified in the Learning Resource Guide (Section I) as well as other sources of information considered appropriate.

7. *Activities/Worksheets*

This section provides student-centred and activity-based projects and assignments that support the module learner expectations. When appropriately aligned with curriculum and assessment standards, successful completion of the projects and assignments will also indicate successful completion of the module.

Strategies for Developing Student Learning Guides

Prior to commencing the development of a student learning guide, teachers are advised to obtain:

- the relevant Guide to Standards and Implementation
- the student learning guide template.

Information communicated to the student in the SLG must parallel and reflect the curriculum and assessment standards as defined for the module. Therefore, critical elements of the Guide to Standards and Implementation that need to be addressed throughout the SLG include:

- module and specific learner expectations
- assessment criteria and conditions
- assessment standards
- assessment tools.

Additional ideas and activities will need to be incorporated into the student learning guide. These can be obtained by:

- reflecting on projects and assignments you have used in delivering programs in the past
- identifying human and physical resources available within the school and community
- networking and exchanging ideas (including SLGs) with other teachers
- reviewing the range of resources (e.g., print, media, software) identified in the Learning Resource Guide (Section I) for a particular module/strand.

Copyright law must also be adhered to when preparing a SLG. Further information and guidelines regarding copyright law can be obtained by referring to the:

- *Copyright Act*
- *Copyright and the Can Copy Agreement.*

A final task in developing a student learning guide involves validating the level of difficulty/challenge/rigour established, and making adjustments as considered appropriate.

A template for developing student learning guides, also available on the Internet, is provided in this section (see “Student Learning Guide Template,” pages J.5–10). Several sample student learning guides are also provided in this section (see “Sample Student Learning Guides,” starting on page J.11).

CAREER & TECHNOLOGY STUDIES

SAMPLE STUDENT LEARNING GUIDE TEMPLATE

WHY

TAKE THIS MODULE?

WHAT

**DO YOU NEED TO KNOW
BEFORE YOU START?**

WHAT

**WILL YOU KNOW AND
BE ABLE TO DO
WHEN YOU FINISH?**

-
-
-
-
-
-
-
-

WHEN

SHOULD YOUR WORK BE DONE?

HOW

**WILL YOUR MARK FOR THIS
MODULE BE DETERMINED?**

	PERCENTAGE
--	------------

WHICH

RESOURCES MAY YOU USE?

<ul style="list-style-type: none">••••••

ACTIVITIES/WORKSHEETS

CAREER & TECHNOLOGY STUDIES

FORESTRY

SAMPLE STUDENT LEARNING GUIDE

FOR1020 Forest Regions of Canada

WHY

TAKE THIS MODULE?

- A fundamental requirement for anyone working in the forest is to be able to identify the types of vegetation present. This often gives clues as to the location and climate of the area. FOR1020 is an introduction to dendrology, the study of trees. This is a module for students interested in being able to identify local tree species and to explain the reasons for the locations of the forest regions of Canada and Alberta.
- This course should be taken in the late spring or early in the fall to make it much easier to identify trees by their leaves rather than the bare twigs in winter.

WHAT

DO YOU NEED TO KNOW BEFORE YOU START?

There are no prerequisites identified for this module.

However, you should be able to:

- locate and describe the geographic regions of Canada
- use and understand maps
- apply the scientific method of inquiry.

WHAT

**WILL YOU KNOW AND
BE ABLE TO DO
WHEN YOU FINISH?**

Upon completion of this module you will be able to:

- identify factors that determine the type and distribution of forests
- locate and describe the forest regions of Canada
- identify and describe trees that grow in specific regions of Canada and Alberta
- demonstrate basic competencies.

WHEN

SHOULD YOUR WORK BE DONE?

Your teacher will give you a timeline for completing tasks and assignments within this module.

You may also wish to use a time-management planning chart to preplan the work that needs to be done in this module. Plan how you will use your class time as well as extra time needed to complete the assignments in this module.

HOW

WILL YOUR MARK FOR THIS MODULE BE DETERMINED?

	PERCENTAGE
You must first demonstrate all of the competencies required for this module.	
When you have done this, your percentage mark for the module will be determined as follows:	
<ul style="list-style-type: none">Moisture Lab	10%
<ul style="list-style-type: none">Test on Factors	10%
<ul style="list-style-type: none">Forest Region Maps (Canada)	25%
<ul style="list-style-type: none">(Alberta)	15%
Leaf Collection	40%

WHICH

RESOURCES MAY YOU USE?

- *Trees and Shrubs of Alberta*
- *Native Trees of Canada*
- *Flora of Alberta*
- *Visions*
- *Guide to Common Native Trees and Shrubs of Alberta*

ACTIVITIES/WORKSHEETS

Assignments:

1. Research and prepare a detailed list of factors that act independently and together to determine the type of forest on a given area. These factors should include information on climate, soil, landforms and topography, and the interactions between the three.
2. Using the Scientific Method develop a hypothesis that tests plant growth rates against moisture availability. Write up the experiment, conduct it and interpret the data collected. Remember to practise safe laboratory habits.
3. Forest Regions of Canada
 - on a large sheet of paper (min. 11x17), pencil in the boundaries of this country. Add the provincial boundaries
 - pencil in the forest regions
 - make sure your map is neat and clearly understandable. It must have a key, scale, north arrow and legend
 - on the next page is a sample sheet you can use to fill in information on each forest region
 - repeat the above list for Alberta and its forest regions.
4. Leaf collection

Collect and prepared for formal presentation the leaves (twigs if winter) of five grasses (omit in winter), five local shrubs, willow, aspen, balsam poplar, white birch, jack pine, lodgepole pine, white and black spruce, larch and balsam fir. The species list may be altered by your teacher to fit local conditions.

Note

*Effective September 1999,
pages J.17 to J.22 have been deleted
and not replaced.*

CAREER & TECHNOLOGY STUDIES

FORESTRY

SAMPLE STUDENT LEARNING GUIDE

FOR1090 Forest Ecology 1 (Ecosystem Dynamics)

WHY

TAKE THIS MODULE?

- Being able to work with living things means you have to understand how things work. The easiest way is to look at the component parts of a system. Therefore, in this module you will look at several parts of the forest. These include tree structure, biotic and abiotic factors of the forest ecosystem, and the role of the tree in the forest.
- Remember you must practise safe work habits in anything you do, especially lab or outdoor activities. If you are not sure how to do something, ask someone having knowledge for instructions first.

WHAT

DO YOU NEED TO KNOW BEFORE YOU START?

There are no prerequisites identified for this module.

However, you should understand and be able to apply the scientific method of inquiry.

WHAT

**WILL YOU KNOW AND
BE ABLE TO DO
WHEN YOU FINISH?**

Upon completion of this module you will be able to:

- describe interrelationships among elements in the forest ecosystem
- describe structural units of the tree and their function in performing life processes
- demonstrate basic competencies.

WHEN

SHOULD YOUR WORK BE DONE?

Your teacher will give you a timeline for completing tasks and assignments within this module.

You may also wish to use a time-management planning chart to preplan the work that needs to be done in this module. Plan how you will use your class time as well as extra time needed to complete the assignments in this module.

HOW

WILL YOUR MARK FOR THIS MODULE BE DETERMINED?

	PERCENTAGE
You must first demonstrate all of the competencies required for this module.	
When you have done this, your percentage mark for the module will be determined as follows:	
<ul style="list-style-type: none">Tree Biology:	
Activity 1.6	10%
Activity 3.2	10%
Tree Drawing	10%
Test	20%
<ul style="list-style-type: none">Forest Ecosystems	
Activity 2.8	10%
Food Web	20%
Test	20%

WHICH

RESOURCES MAY YOU USE?

- *Alberta Parks and Recreation: Learning Resources Manual* (Alberta government)
- *Investigating Terrestrial Ecosystems*
- *Field and Laboratory Methods for General Ecology*
- *Managing Your Wood Lot* (Canadian Forest Service)
- *Seeing the Forest Among the Trees*
- *Ecology*
- *Biology*

ACTIVITIES/WORKSHEETS

Section 1: Tree Biology

- Activity 1.6 on page 11 in *Investigating Terrestrial Ecosystems*.
- Activity 3.7 on page 47 in *Investigating Terrestrial Ecosystems*.
- On a large sheet of paper, draw a cross-section of a tree (top to bottom) that shows all components. Label each component. Then, on a separate sheet of paper explain the importance of each structure as well as the processes it carries out. List the percentage by weight and volume that each structure makes up of the tree total; e.g., the leaves make up 1% of the tree's weight and 1.7% of its volume. As well, explain what would happen to the tree if the specific structure had its function impaired or destroyed.
- Completed a written test that will examine you on the structural components of trees, and the function of these components.

Section 2: Forest Ecosystems

- Read chapters 1, 2 and 3 in *Investigating Terrestrial Ecosystems*.
- Activity 2.8 on page 33 of *Investigating Terrestrial Ecosystems*.
- Visit a forested area and prepare a comprehensive food web of the area. Plan this trip with your teacher. Make sure you address all aspects of safety. Plan two trip dates so that if the weather is bad on the first you can go on the second. Once at the area collect data on:
 - types of animals present. Determine numbers and area in which animals are found.
Look for: scat
tracks
bones
actual sightings
 - types of grass/shrubs/fungi and mosses present.
Determine numbers and area in which species are found.
 - types and numbers of trees present and area in which trees are found.
 - types and numbers of insects present.
 - soil quality (use a soil test kit).

Return to classroom with the data. On a large sheet of paper draw a food web using the data you collected. Explain the interrelationships that your food web shows. Prepare it for presentation (make it look good) and hand it in with your field notes.

- Write a test on the material presented in the three chapters and your observations on the field trip.

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