KNOWLEDGE/APPLICATION ASSESSMENT: Significance of Forests **FOR1010–1**

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

Background Information

See *Alberta's Focus on Forests*:

- Activity 1.4: How Forests Affect the Environment
- Activity 4.2: Products from Canada's Forests
- Activity 5.1: Forest Values.

See *Woodlot Management Guide for the Prairie Provinces*, page i-6: Potential Benefits from Woodlots:

- Cash Returns
- Personal Use
- Insurance
- Erosion Control
- Windbreaks and Crop Enhancement
- Winter Shelter
- Landscape Aesthetics
- Wildlife Habitat
- Moisture Management and Snow Catching
- Environmental Aspect.

Sample Questions/Activities

1. **Describe six or more ways in which local forests have social and cultural significance;** e.g.:
   - recreational
   - spiritual
   - aesthetic
   - medicinal
   - community dependence.

2. **Describe six or more ways in which local forests have economic significance;** e.g.:
   - employment
   - product export
   - tourism
   - subsistence
   - tax base

3. **Describe six or more ways in which local forests have environmental significance;** e.g.:
   - wildlife and fisheries habitat
   - watershed protection and maintenance
   - water, air and soil quality
   - maintenance of ecosystems

SAMPLE TIMELINE: Forestry in North America **FOR1010–2**

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.
3600 BC	Earliest use of paper, a papyrus document.
105	T'sai Lun invents paper using silk, bark and hemp.
1150	Moors introduce paper to Europe.
1604	Samuel de Champlain establishes one of the earliest European settlements in Canada, on an island in the Saint Croix River.
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.
1719	A French physicist, Reaumur, states that paper can be made from the fibres of plants, including trees.
1763	American Revolution restricts British access to New England timber supply. Britain begins to exploit Atlantic Canada forests for masts and spars.
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.
1799	Nicolas Robert of France patents the first papermaking machine. Until this time, paper has been made entirely by hand, sheet by sheet.
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.
1817	First of many paper mills in Lower Canada (Quebec), built by Artemus Jackson.
1819	First paper mill in the Maritimes built by Anthony Holland to supply his newspaper with paper.
1843	Paper is still manufactured largely from linen and cotton rags. But interest in wood as a possible raw material is increasing. Friedrich Keller invents the process for manufacturing groundwood pulp.
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.
1849	First sawmills appear on Vancouver Island, just outside of Victoria.
1850	Pine and oak timber is in great demand for export.
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.
1860	Lumber exports begin from western Canada, mainly to South America, Australia and San Francisco.
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.
1891	British Columbia prohibits exports of pulpwood from crown lands.
1899	Elihu Stewart, the first Dominion Forester, is hired.

DATE	EVENT
1900	As the 20th century begins, papermaking in Canada is still a small industry serving domestic needs.
1907	First forestry school in Canada opens at the University of Toronto.
1912	The first forest fire protection association is formed in St. Maurice, Quebec.
1914	The east coast lumber industry begins to decline. The best timber is depleted and Britain reestablishes links with Baltic lumber merchants.
1916	Demands on forests during World War I reduce available timber to low levels.
1918	Canada becomes the world's largest exporter of pulp and paper.
1919	For the first time in Canada, aircraft are used for fire patrol and photographic mapping.
1924	Protectionism in the U.S. closes the American market to Canadian timber.
1926	Canada's newsprint production exceeds that of the U.S.
1930	The Great Depression reduces pulp and paper production by one third.
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.

DATE	EVENT
1950	The gas-powered chainsaw comes into wide use in Canadian forests. The wheeled skidder called the Bonnard prehauler is introduced
1960	Government and industry increase conservation efforts; the amount of trees cut now equal the amount grown.
1964	A large expansion of the Canadian forest industry occurs. New mills are built in every region of Canada, particularly British Columbia.
1966	The timber quota system is introduced in Alberta to provide the forest industry with long term timber inventories.
1975	The Forest Engineering Research Institute of Canada is established.
1979	The Canadian pulp and paper industry produces 20 million tonnes of pulp, paper and paperboard valued at $8 billion.
1987	More than 800 million seedlings are planted in an effort to make Canada's forest resource healthier and more productive.
1988	Valued at $14 billion, pulp and paper remains Canada's most important manufacturing sector.
1990	Biodiversity in the forest becomes a major issue in Canada and the world.
19__	Canadian society insists on environmental auditing of forestry operations.

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

Content
- ☐ describes the impact of personal actions and lifestyle on the forest resource; e.g.:
  - consumer choices
  - recreational patterns
- ☐ prepares an inventory of household materials used on a daily basis that are derived from the forest resource

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
- ☐ _____
- ☐ _____

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					
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 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:

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

See *Alberta's Focus on Forests*:

- Activity 3.1: A Lot Depends on Location
- Activity 3.4: Forests: Thriving or Declining.

See *Investigating Terrestrial Ecosystems*:

- Chapter 6: Adaptations of Organisms to Light and Soil
- Chapter 7: Weather, Climate and Biomes.

Sample Questions/Activities

1. **Explain ways in which climatic factors affect the growth of trees;** e.g.:
   - temperature
   - moisture
2. **Explain ways in which land form factors affect the growth of trees;** e.g.:
   - topography
   - soil characteristics
3. **Integrate information about climatic and land form factors to explain species distribution within forest regions.**
4. **Given a natural region of Alberta or Canada, suggest five or more reasons for the distribution of trees within that region.**

MUSEUM CONSERVATION RULES FOR LEAF/TWIG COLLECTION FOR1020–3

ASSESSMENT CRITERIA Each specimen in the collection to be assessed according to the following criteria:	RATING SCALE 0	1	2	3
1. Completeness • specimen must include typical <u>needles/leaves, twig and terminal bud</u> • cone, fruit or seed to be included where feasible • minimum 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 No cone or fruit	All components present Size above minimum Cone/fruit included
2. Pressing: • specimen to be flattened so that the undersides of some needles/leaves face upward • no folding or bending of tissue to be evident.	Foliage not flat Underside of foliage not visible Substantial folding of tissue	Foliage flat Underside of foliage not visible Significant folding of tissue	Foliage flat Underside of some foliage faces upward Minor folding of tissue	Foliage Flat Underside of some foliage faces upward All tissue laying flat
3. Mounting: • dried specimens are attached to Bristol board with white glue or Gum Arabic • conifers may be placed in Ryker mounts • specimen must occupy central position on mounting sheet (or in Ryker mount) • orientation vertical or at 45^{o} to vertical (terminal bud to top).	Scotch tape Horizontal or downward orientation Smears evident	White glue Horizontal or downward orientation Minor smears or excess glue	White glue Vertical or upward orientation Excess/insufficient glue used	White glue Vertical or upward orientation Sheet clear of smears, excess glue
4. Labelling: family name scientific name common name geographic location where collected habitat name of collector date of collection	Incomplete information Incorrect sequence for more than 2 items	Habitat or location missing 1-2 items out of sequence	Complete information 1-2 items out of sequence	Complete information Correct sequence
5. Identification: • 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

The student:

- ☐ 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

The student:

- ☐ 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

The student:

- ☐ 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

The student:

- ☐ constructs a shelter demonstrating the least possible impact on the environment
- ☐ uses environmentally friendly materials, and limits the use/disposal of petroleum products

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 1 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

RELECTIONS/COMMENTS

[The 1997 text was deleted September 1999.]

PORTFOLIO ASSESSMENT: Maps Used in Forestry **FOR1050–1**

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

The student:

- ☐ 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

The student:

- ☐ 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

BASIC COMPASS AND MEASUREMENT SKILLS (continued)

The student:

- ☐ 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
- ☐

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

See *Managing the Forest*:

Maps
- Topographic Map Interpretation
- Contour Mapping

Air Photographs
- Photo Mosaic
- Drainage Patterns
- Stereogram

Sample Questions/Activities

1. **Read and interpret maps and aerial photographs, explaining information conveyed through:**
   - 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:**
   - 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

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

The student:

- ☐ follows a schedule of activities for each orienteering task
- ☐ selects and 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
- ☐ critically examines task performance, identifying strengths and areas that need improvement

BASIC COMPASS AND MEASUREMENT SKILLS

The student:

- ☐ orients a 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

BASIC COMPASS AND MEASUREMENT SKILLS (continued)

The student:

- ☐ establishes and follows a bearing using a 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
- ☐ performs a closed traverse, error in closure no greater than 5% of perimeter distance:
  - ☐ starts at 0 degrees and walk 10 metres. Places stick in ground at this point
  - ☐ 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
  - ☐ 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
  - ☐ 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
- ☐

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.

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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

ALLOCATING TIME AND MATERIALS

The student:

- ☐ 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

The student:

- ☐ 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)
- ☐

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.
- ☐

TABULATING AND PRESENTING RESULTS

The student:

- ☐ 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:

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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

ALLOCATING TIME AND MATERIALS

The student:

- ☐ 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

The student:

- ☐ 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

CONDUCTING THE FOREST SURVEY (continued)

The student:

- ☐ 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

The student:

- ☐ 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
- ☐

STANDARD IS 1 IN EACH APPLICABLE TASK

Rating Scale

The student:

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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:

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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

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:

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

See *Alberta's Focus on Forests*:

- 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

Sample Questions/Activities

1. **Explain vital life processes performed by trees and other forest plants;** e.g.:
   - nutrient uptake and transportation
   - photosynthesis
   - respiration and transpiration
   - reproduction
   - phenology (leaf flushings, leaf fall, flowering and cone production)

2. **Provide labelled diagrams of major tree parts;** e.g.:
   - root
   - trunk/stem
   - branch/twig
   - leaf
   - flower

3. **Describe the function of major tree parts in performing vital life processes.**

4. **Describe interrelationships among tree structures, their functions, and vital life processes that are performed.**

5. **Describe major stages in the life cycle of a native tree.**

6. **Describe the role of trees in the water cycle.**

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.

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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
- ☐ 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:

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

See *Alberta's Focus on Forests*:

Unit 4 - Forest Resources and Technologies

- 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

Unit 5 - Forest Management for All

- Activity 5.1: Forest Values
- Activity 5.2: Decision for Change
- Activity 5.3: Forest Perspectives

Sample Questions/Activities

1. **Provide an overview of changing patterns of forest use in Canada and Alberta from past to present;** e.g.:
   - aboriginal use
   - fur trade
   - land clearing for agriculture
   - ship building
   - urbanization
   - sawmilling
   - pulp and paper
   - value-added products
   - recreational uses.

2. **Describe the history of forest land administration in Canada and Alberta;** e.g.:
   - Federal jurisdiction
   - Provincial status
   - *Natural Resources Transfer Act.*

3. **Suggest three or more ways in which changes in forest use (and management) have affected:**
   - the economy
   - the environment.

4. **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.

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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

See *Our Growing Resource*, Chapter 2 - The Challenge of Sustainable Development:

- Managing Forest Development
- Integrated Resource Management - Accommodating Many Uses
- Harvest Planning and Practices
- Reforestation
- Air and Water Quality
- Building Sustainable Businesses.

Sample Questions/Activities

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:**
   "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.:
   - 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.:
   - 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	N/A
Content	4	3	2	1	0	N/A
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.

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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., <u>*Written:*</u> *spelling, punctuation, grammar, basic format*
  <u>*Oral:*</u> *voice projection, body language*
  <u>*Audio-Visual:*</u> *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:

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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

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

The student:

- ☐ 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
- ☐

USING THE IDENTIFICATION KEY TO IDENTIFY FOREST PESTS

The student:

- ☐ explains basic terminology used in the *Identification Key for Forest Pests* (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
- ☐

RECOMMENDING PREVENTION/ CONTROL STRATEGIES

The student:

- ☐ uses information provided in the *Identification Key for Forest Pests* (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

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
Resinosus:	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 stern 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

Key 2: Physical Injuries

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

Key 3: Disease 1

f. Sap, tunnels, bark and wood fragments around root collar, roots chewed

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

Key 1: General 2

h. Main stem and/or branches affected

a. Trees erect or windthrown in random manner, cankers, fungi, sap, brooms or swellings

Key 3: Disease 1

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

Key 2: Physical Injuries

j. Pitch, frass or cottony tufts present, branch or main stem gouting and/or breakage which may or may not be present

Key 4: Animal/Insect Damage

a. Foliage affected

b. Trees affected in widespread area, especially in low lying areas or in bands along slopes

Key 2: Physical Injuries 1

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: Disease 1

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 4: Animal/Insect Damage

a. Leaders and/or branch tips affected

d. Bark removed or tips clipped off

Key 4: Animal/insect 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, silk or cottony tufts present

Key 4: Animal/Insect Damage

e. Tips discoloured

f. Small dark fruiting bodies or white to orange blisters or cankers on bark

Key 3: Disease 1

f. Buds mushy, in low lying areas or industrial site nearby

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

Key 2: Physical Injuries 2

a. Tree erect

b. Damage to main stem and/or branches

Key 2: Physical Injuries

b. Damage to crown

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 Injures 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

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

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 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 think 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

Key 3: Disease 2

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

d. No brooms or aerial shoots

Key 3: Disease 2

d. Brooms present, minor needle discolouration, 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

KEY 4: ANIMAL/INSECT DAMAGE

Animal Damage

a. Bark removed from roots, branches or stem
- b. Bark removed from buried roots

  Vole
- 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

        Bear
      - e. Shredded bark remaining on tree, long vertical tooth marks

        Deer
    - d. Bark and sapwood gnawed
      - f. Shallow gnaw marks
        - g. Exposed sapwood has rough appearance

          Snowshoe Hare or Cottontail Rabbit
        - g. Exposed sapwood fairly smooth

          Tree Squirrel
      - f. Deep gnaw marks, distinct tooth marks

        Porcupine
  - c. Damage above 2.5 m
    - h. Shallow gnaw marks

      Tree Squirrel
    - h. Deep gnaw marks

      Porcupine

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

  Defoliators (Sawflies or Budworms)
- b. Deciduous hosts

  Defoliators (Tent Caterpillars, Leaf-Eating Beetles, Leaf Miners)

a. Leaders and branches, stems, roots or cones affected
- c. Leaders and branches affected

  Terminal Weevils
- c. Main stems affected
  - d. Entire tree dying. Crown yellow or reddish brown: boring dust around base of tree, tunnels on inside of bark

    Bark Beetles
  - d. 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
- 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

  Warren's Root Collar Weevil
- c. Cones and/or seed affected
  - g. Pitch and silk webbing present on the exterior of the cone

    Coneworms
  - h. Absence of pitch and silk. Exit holes on exterior of cone may be visible

    Chalcid Wasp