

## Alberta Science 7-9

1. Investigate plant uses; and identify links among needs, technologies, products and impacts • illustrate and explain the essential role of plants within the environment • describe human uses of plants as sources of food and raw materials, and give examples of other uses (e.g., identify uses of plants as herbs or medicines; describe plant products, and identify plant sources on which they depend) • investigate trends in land use from natural environments (e.g., forests, grasslands) to managed environments (e.g., farms, gardens, greenhouses) and describe changes • investigate practical problems and issues in maintaining productive plants within sustainable environments, and identify questions for further study (e.g., investigate the long-term effects of irrigation practices or fertilizer use)

- describe life cycles of seed plants, and identify example methods used to ensure their germination, growth and reproduction (e.g., describe propagation of plants from seeds and vegetative techniques, such as cuttings; conduct a germination study; describe the use of beehives to support pollination)

3. Analyze plant environments, and identify impacts of specific factors and controls • describe methods used to increase yields, through modifying the environment and by creating artificial environments (e.g., describe processes used in raising bedding plants or in vegetable production through hydroponics) • investigate and describe characteristics of different soils and their major component (e.g., distinguish among clayey soils, sandy soils and soils rich in organic content; investigate and describe particle sizes, compaction and moisture content of soil samples) • identify practices that may enhance or degrade soils in particular applications • describe and interpret the consequences of using herbicides, pesticides and biological controls in agriculture and forestry

1. Describe and interpret different types of structures encountered in everyday objects, buildings, plants and animals; and identify materials from which they are made • recognize and classify structural forms and materials used in construction (e.g., identify examples of frame structures, such as goal posts and girder bridges, examples of shell structures, such as canoes and car roofs, and examples of frame-and-shell structures, such as houses and apartment buildings) • interpret examples of variation in the design of structures that share a common function, and evaluate the effectiveness of the designs (e.g., compare and evaluate different forms of roofed structures, or different designs for communication towers) • describe and compare example structures developed by different cultures and at different times; and interpret differences in functions, materials and aesthetics (e.g., describe traditional designs of indigenous people and peoples of other cultures; compare classical and current designs; investigate the role of symmetry in design) • describe and interpret natural structures, including the structure of living things and structures created by animals (e.g., skeletons, exoskeletons, trees, birds' nests) • identify points of failure and modes of failure in natural and built structures (e.g., potential failure of a tree under snow load, potential failure of an overloaded bridge)

3. Investigate and analyze the properties of materials used in structures • devise and use methods of testing the strength and flexibility of materials used in a structure (e.g., measure deformation under load) • identify points in a structure where flexible or fixed joints are required, and

evaluate the appropriateness of different types of joints for the particular application (e.g., fixed jointing by welding, gluing or nailing; hinged jointing by use of pins or flexible materials) • compare structural properties of different materials, including natural materials and synthetics • investigate and describe the role of different materials found in plant and animal structures (e.g., recognize the role of bone, cartilage and ligaments in vertebrate animals, and the role of different layers of materials in plants)

4. Demonstrate and describe processes used in developing, evaluating and improving structures that will meet human needs with a margin of safety • demonstrate and describe methods to increase the strength of materials through changes in design (e.g., corrugation of surfaces, lamination of adjacent members, changing the shape of components, changing the method of fastening) • identify environmental factors that may affect the stability and safety of a structure, and describe how these factors are taken into account (e.g., recognize that snow load, wind load and soil characteristics need to be taken into account in building designs; describe example design adaptations used in earthquake-prone regions) • analyze and evaluate a technological design or process on the basis of identified criteria, such as costs, benefits, safety and potential impact on the environment