Fall

HOW THE FALL CURRICULUM CHARTS ARE ORGANIZED

The Learning Outcomes that follow from **Science** must be taught during the FALL season. Learning outcomes must be grounded in Nehiyaw Ways of Knowing and Land Based Learning. Note that all Attitudes and Skills listed at the end of each science unit are important and should be included as part of the unit of study, but are not highlighted as essential because it was inferred that they have been taught in elementary grades or are cross curricular.

These **Science** charts include suggested, although not exhaustive, connections to Nehiyaw Ways of Knowing and Land Based Learning. Throughout the year, teachers will collaborate and generate more/other ideas that will value add to the suggested connections.

Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning FALL ELO rows are highlighted
	UNIT B: PLANTS FOR FOOD AND FIBRE		
	SPECIFIC OUTCOMES FOR SCIENCE, TECHNOLOGY AND SOCIETY		
1. Investigate plant uses; and identify links among needs, technologies, products and impacts	• **illustrate and explain the essential role of plants within the environment**		**Medicinal use of plants; plants as food in various food chains (animals and humans); plants to prevent erosion; plants as shelter; plants as markers/finding location**
	• **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)**		**Plants to make clothing, furniture, writing materials, houses, cleaning agents, perfumes, dyes, thickening agents, etc.**
	• **investigate trends in land use from natural environments (e.g., forests, grasslands) to managed environments (e.g., farms, gardens, greenhouses) and describe changes**		**Look at history of First Nations people from respect for the land use**
	• 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)		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning FALL ELO rows are highlighted
2. Investigate life processes and structures of plants, and interpret related characteristics and needs of plants in a local environment	• **describe the general structure and functions of seed plants (e.g., describe the roots, stem, leaves and flower of a common local plant)**		**Focus on the local plants endemic to your area - Treaty 8 territory (eg. wild mint). Ask an Elder to talk about the importance of the roots, etc. and how they were used to help as medicine**
	• **investigate and interpret variations in plant structure, and relate these to different ways that plants are adapted to their environment (e.g., distinguish between plants with shallow spreading roots and those with deep taproots; describe and interpret differences in flower form and in the timing of flower production)**		**Examples: Tree roots vs thisle roots; roots in rocky places vs roots in soft soil; saskatoon blossoms and berries vs blueberry or high bush cranberry blossoms and berries; ratroot vs cat tails**
	• **investigate and interpret variations in needs of different plants and their tolerance for different growing conditions (e.g., tolerance for drought, soil salinization or short growing seasons)**		**Focus on the local plants endemic to your area - Treaty 8 territory**
	• **describe the processes of diffusion, osmosis, conduction of fluids, transpiration, photosynthesis and gas exchange in plants [Note: This item requires a general understanding of the processes; it does not require knowledge of the specific biochemistry of these processes.]**		
	• **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		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning FALL ELO rows are highlighted
3. Analyze plant environments, and identify impacts of specific factors and controls (continued)	• **describe and interpret the consequences of using herbicides, pesticides and biological controls in agriculture and forestry**		**Spraying the side of the road descreases the amount of sage that can be picked. Broad leaf pesticides kill more than the plant it was intended for - it kills all plants with leaves.**
4. Identify and interpret relationships among human needs, technologies, environments, and the culture and use of living things as sources of food and fibre	• investigate and describe the development of plant varieties through selective breeding, and identify related needs and problems (e.g., identify needs leading to the development of new grain varieties; identify problems arising from the development of new plant varieties that require extensive fertilization)		
	• **investigate and identify intended and unintended consequences of environmental management practices (e.g., identify problems arising from monocultural land use in agricultural and forestry practices, such as susceptibility to insect infestation or loss of diversity)**		**Broad leaf pesticides kill more than the plant it was intended for - it kills all plants with leaves; the oil industry - new development and new jobs, but other consequences also come into play; several niches of an ecosystem are being affected**
	• identify the effects of different practices on the sustainability of agriculture and environmental resources (e.g., identify positive and negative effects of using chemical fertilizers and pesticides and of using organic farming practices)		
SPECIFIC OUTCOMES FOR SKILLS			
Initiating and Planning Ask questions about the relationships between and among observable variables, and plan investigations to address those questions	• define practical problems (e.g., identify problems in growing plants under dry conditions)		
	• identify questions to investigate arising from practical problems and issues (e.g., What methods will help limit moisture loss from plants and soil? What reduction in the loss of soil moisture can be achieved through the use of a plastic ground sheet or through the use of a plastic canopy?)		
	• rephrase questions in a testable form, and clearly define practical problems (e.g., rephrase a broad question, such as: "What amount of fertilizer is best?" to become "What effect will the application of different quantities of fertilizer X have on the growth of plant Y and its environment?")		

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Initiating and Planning Ask questions about the relationships between and among observable variables, and plan investigations to address those questions (continued)	• state a prediction and a hypothesis based on background information or an observed pattern of events (e.g., predict the effect of a particular plant treatment)		
	• formulate operational definitions (e.g., define the health of a plant in terms of its colour and growth pattern)		
Performing and Recording Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data	• research information relevant to a given problem		
	• construct and test a prototype design to achieve a specific purpose (e.g., develop and test a device for watering house plants over a two-week absence)		
	• observe and record data, and create simple line drawings (e.g., describe plant growth, using qualitative and quantitative observations; draw and describe plant changes resulting from an experimental procedure)		
	• estimate measurements (e.g., estimate plant populations; estimate the surface area of a leaf)		
Analyzing and Interpreting Analyze qualitative and quantitative data, and develop and assess possible explanations	• identify strengths and weaknesses of different methods of collecting and displaying data (e.g., compare two different ways to measure the amount of moisture in soil; evaluate different ways of presenting data on the health and growth of plants)		
	• use and/or construct a classification key (e.g., distinguish among several grain varieties, using a classification guide or key)		
	• compile and display data, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, bar graphs and line graphs (e.g., prepare a record of a plant's growth that charts its development in terms of height, leaf development, flowering and seed production)		
	• identify new questions and problems that arise from what was learned		
Communication and Teamwork Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	• receive, understand and act on the ideas of others (e.g., adopt and use an agreed procedure for counting or estimating the population of a group of plants)		
	• communicate questions, ideas, intentions, plans and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language and other means (e.g., show the growth of a group of plants over time through a data table and diagrams)		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning FALL ELO rows are highlighted
Communication and Teamwork Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results (continued)	• evaluate individual and group processes used in planning, problem solving, decision making and completing a task		
SPECIFIC OUTCOMES FOR ATTITUDES			
Interest in Science	Show interest in science-related questions and issues, and pursue personal interests and career possibilities within science-related fields (e.g., observe plants in the local community, and ask questions about plants with unusual characteristics; pursue a hobby related to the study of living things; express an interest in science-related/technology-related careers)		
Mutual Respect	Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds (e.g., show awareness of the diversity of agricultural practices used by societies around the world at different times through history; appreciate the role of Aboriginal knowledge in identifying useful herbs and medicines)		
Scientific Inquiry	Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues (e.g., consider the nutrient content of food they eat and the potential presence of residues; consider observations and ideas from a number of sources, during investigations and before drawing conclusions)		
Collaboration	Work collaboratively in carrying out investigations and in generating and evaluating ideas (e.g., assume responsibility for their share of work in preparing for investigations and in gathering and recording evidence; consider alternative ideas and approaches suggested by members of the group; share the responsibility for difficulties encountered in an activity)		
Stewardship	Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment (e.g., voluntarily care for plants in a school or home environment; assume personal responsibility for their impact on the environment; recognize that their consumption habits have environmental consequences)		
Safety	Show concern for safety in planning, carrying out and reviewing activities (e.g., read the labels on materials before using them, and ask for help if safety symbols are not clear or understood; clean their work area during and after an activity)		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning FALL ELO rows are highlighted
	UNIT A: INTERACTIONS AND ECOSYSTEMS ***LATER PART OF FALL (OCTOBER/NOVEMBER)**		
	SPECIFIC OUTCOMES FOR SCIENCE, TECHNOLOGY AND SOCIETY		
1. Investigate and describe relationships between humans and their environments, and identify related issues and scientific questions	• **illustrate how life-supporting environments meet the needs of living things for nutrients, energy sources, moisture, suitable habitat, and exchange of gases**		**Plants used for medicinal purposes; Feasts as a way of giving thanks to mother earth for supplying essential nutrients; identify local plants and animals that provide nutrients**
	• **describe examples of interaction and interdependency within an ecosystem (e.g., identify examples of dependency between species, and describe adaptations involved; identify changing relationships between humans and their environments, over time and in different cultures—as, for example, in aboriginal cultures)**		**Hunting, fishing, trapping, harvesting, moose calls, nomatic movement adapting to the environment; discussions about the medicine wheel**
	• **identify examples of human impacts on ecosystems, and investigate and analyze the link between these impacts and the human wants and needs that give rise to them (e.g., identify impacts of the use of plants and animals as sources of food, fibre and other materials; identify potential impacts of waste products on environments)**		**Clear cutting of forests, building houses or cabins on agricultural lands and on trap lines is destroying the ability to live off the land and disturbing the boreal forest; use absoluetly all parts of the animal vs over harvesting/hunting, when we take from the earth we give back to the earth**
	• analyze personal and public decisions that involve consideration of environmental impacts, and identify needs for scientific knowledge that can inform those decisions		
2. Trace and interpret the flow of energy and materials within an ecosystem	• **analyze an ecosystem to identify biotic and abiotic components, and describe interactions among these components**		**Interactions between water and humans; animal shelters; discuss animate vs inanimate objects (eg. water and rocks as living and sacred); migrations of birds**

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2. Trace and interpret the flow of energy and materials within an ecosystem (continued)	• **analyze ecosystems to identify producers, consumers and decomposers; and describe how energy is supplied to and flows through a food web, by:** **– describing and giving examples of energy and nutrient storage in plants and animals** **– describing how matter is recycled in an ecosystem through interactions among plants, animals, fungi, bacteria and other microorganisms** **– interpreting food webs, and predicting the effects of changes to any part of a web**		**Look at food pyramids from the ground up (eg. grasses, moose, humans); as Indigenous people we believe we go back to the earth - life cycles and being a part of the earth; Indigenous perspective on how energy travels and which foods give the most energy (eat non-processed food); how the lands sustained First Nations over time. We need to continue to protect the land so that it will continue to sustain.**
	• describe the process of cycling carbon and water through an ecosystem		
	• identify mechanisms by which pollutants enter and move through the environment, and can become concentrated in some organisms (e.g., acid rain, mercury, PCBs, DDT)		
3. Monitor a local environment, and assess the impacts of environmental factors on the growth, health and reproduction of organisms in that environment	• investigate a variety of habitats, and describe and interpret distribution patterns of living things found in those habitats (e.g., describe and compare two areas within the school grounds—a relatively undisturbed site and a site that has been affected by heavy use; describe and compare a wetland and a dryland area in a local parkland)		
	• investigate and interpret evidence of interaction and change (e.g., population fluctuations, changes in weather, availability of food or introduction of new species into an ecosystem)		
	• identify signs of ecological succession in local ecosystems (e.g., emergence of fireweed in recently cut forest areas, replacement of poplar by spruce in maturing forests, reestablishment of native plants on unused farmland)		
4. Describe the relationships among knowledge, decisions and actions in maintaining life-supporting environments	• **identify intended and unintended consequences of human activities within local and global environments (e.g., changes resulting from habitat loss, pest control or from introduction of new species; changes leading to species extinction)**		**Clear cutting; plant species introduced from Europe that flourished because there were no natural predators; history of the buffalo as a result of overhunting; weather and environmentat changes that iare pushing the polar bear (and other animals) further south.**

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4. Describe the relationships among knowledge, decisions and actions in maintaining life-supporting environments (continued)	• describe and interpret examples of scientific investigations that serve to inform environmental decision making		
	• **illustrate, through examples, the limits of scientific and technological knowledge in making decisions about life-supporting environments (e.g., identify limits in scientific knowledge of the impact of changing land use on individual species; describe examples in which aboriginal knowledge—based on long-term observation—provides an alternative source of understanding)**		**Talk about the wisdom of only taking what you need from the land and giving back to the land, use every part of the plant or animal that you take from the land; when the land changes sources of medicine disappear - we must be stewards of the land; Invite Willie Ermine as an expert to share his wisdom in this area.**
	• **analyze a local environmental issue or problem based on evidence from a variety of sources, and identify possible actions and consequences (e.g., analyze a local issue on the control of the beaver population in a nearby wetland, and identify possible consequences)**		**Berries impacted by heat; fish dying in the lakes as a result of water temperature going up; forest fires evacuating people from their homes; descrease in the elk population; cancer in the animals in Swan Hills.**
SPECIFIC OUTCOMES FOR SKILLS			
Initiating and Planning Ask questions about the relationships between and among observable variables, and plan investigations to address those questions	• **identify science-related issues (e.g., identify a specific issue regarding human impacts on environments)**		**Air and water quality, temperature increases, deforestation, habitat loss; oil industry**
	• **identify questions to investigate arising from practical problems and issues (e.g., identify questions, such as: "What effects would an urban or industrial development have on a nearby forest or farming community?")**		
	• **state a prediction and a hypothesis based on background information or an observed pattern of events (e.g., predict changes in the population of an organism if factor X were increased, or if a species were introduced or removed from the ecosystem; propose factors that will affect the population of a given animal species)**		

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Initiating and Planning Ask questions about the relationships between and among observable variables, and plan investigations to address those questions (continued)	• **select appropriate methods and tools for collecting data and information (e.g., select or develop a method for estimating a plant population within a given study plot; design a survey as a first step in investigating an environmental issue)**		
Performing and Recording Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data	• research information relevant to a given problem or issue		
	• select and integrate information from various print and electronic sources or from several parts of the same source (e.g., compile information on a global environmental issue from books, magazines, pamphlets and Internet sites, as well as from conversations with experts)		
	• use tools and apparatus effectively and accurately for collecting data (e.g., measure factors, such as temperature, moisture, light, shelter and potential sources of food, that might affect the survival and distribution of different organisms within a local environment)		
	• estimate measurements (e.g., estimate the population of a given plant in a one square metre quadrat, and use this figure to estimate the population within an area of 100 square metres)		
Analyzing and Interpreting Analyze qualitative and quantitative data, and develop and assess possible explanations	• identify strengths and weaknesses of different methods of collecting and displaying data (e.g., compare two different approaches to measuring the amount of moisture in an environment; analyze information presented by proponents on two sides of an environmental issue)		
	• compile and display data, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, bar graphs and line graphs (e.g., illustrate a food web, based on observations made within a given environment)		
	• **classify organisms found in a study plot**		

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Communication and Teamwork Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	• communicate questions, ideas, intentions, plans and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language and other means (e.g., present findings from an analysis of a local issue, such as the control of the beaver population in a nearby wetland) • evaluate individual and group processes used in planning, problem solving, decision making and completing a task • defend a given position on an issue, based on their findings (e.g., make a case for or against on an issue, such as: "Should a natural gas plant be located near a farming community?")		
SPECIFIC OUTCOMES FOR ATTITUDES			
Interest in Science	Show interest in science-related questions and issues, and pursue personal interests and career possibilities within science-related fields (e.g., take an interest in media reports on environmental issues, and seek out further information; express an interest in conducting scientific investigations of their own design; develop an interest in careers related to environmental sciences)		
Mutual Respect	Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds (e.g., show awareness of and respect for aboriginal perspectives on the link between humans and the environment)		
Scientific Inquiry	Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues (e.g., take the time to accurately gather evidence and use instruments carefully; consider observations, ideas and perspectives from a number of sources during investigations and before drawing conclusions and making decisions)		
Collaboration	Work collaboratively in carrying out investigations and in generating and evaluating ideas (e.g., consider alternative ideas, perspectives and approaches suggested by members of the group; share the responsibility for carrying out decisions)		

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Stewardship	**Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment (e.g., assume personal responsibility for their impact on the environment; predict consequences of proposed personal actions on the environment; consider both immediate and long-term consequences of group actions; identify, objectively, potential conflicts between responding to human wants and needs and protecting the environment)**		
Safety	Show concern for safety in planning, carrying out and reviewing activities (e.g., select safe methods and tools for collecting evidence and solving problems; assume personal responsibility for their involvement in a breach of safety or in waste disposal procedures)		

Winter

HOW THE WINTER CURRICULUM CHARTS ARE ORGANIZED

The Learning Outcomes that follow from **Science** must be taught during the WINTER season. Learning outcomes must be grounded in Nehiyaw Ways of Knowing and Land Based Learning. Note that all Attitudes and Skills listed at the end of each science unit are important and should be included as part of the unit of study, but are not highlighted as essential because it was inferred that they have been taught in elementary grades or are cross curricular. Science outcomes identified in this chart also cross over to the SPRING season.

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	UNIT C: HEAT AND TEMPERATURE		
	SPECIFIC OUTCOMES FOR SCIENCE, TECHNOLOGY AND SOCIETY		
1. Illustrate and explain how human needs have led to technologies for obtaining and controlling thermal energy and to increased use of energy resources	• **investigate and interpret examples of heat-related technologies and energy use in the past (e.g., investigate uses of heat for domestic purposes, such as cooking or home heating, and for industrial processes, such as ceramics, metallurgy or use of engines)**		
	• **trace linkages between human purposes and the development of heat-related materials and technologies (e.g., development of hair dryers and clothes dryers; development of protective clothing, such as oven mitts, ski suits and survival clothing)**		
	• **identify and explain uses of devices and systems to generate, transfer, control or remove thermal energy (e.g., describe how a furnace and wall thermostat keep a house at a constant temperature)**		
	• **identify examples of personal and societal choices in using energy resources and technology (e.g., identify choices that affect the amount of hot water used in their daily routines; identify choices in how that water is heated)**		

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2. Describe the nature of thermal energy and its effects on different forms of matter, using informal observations, experimental evidence and models	• **compare heat transmission in different materials (e.g., compare conduction of heat in different solids**	❄	
	• **compare the absorption of radiant heat by different surfaces) explain how heat is transmitted by conduction, convection and radiation in solids, liquids and gases**		
	• **describe the effect of heat on the motion of particles; and explain changes of state, using the particle model of matter**		
	• **distinguish between heat and temperature; and explain temperature, using the concept of kinetic energy and the particle model of matter**		
	• investigate and describe the effects of heating and cooling on the volume of different materials, and identify applications of these effects (e.g., use of expansion joints on bridges and railway tracks to accommodate thermal expansion)		
3. Apply an understanding of heat and temperature in interpreting natural phenomena and technological devices	• **describe ways in which thermal energy is produced naturally (e.g., solar radiation, combustion of fuels, living things, geothermal sources and composting)**		
	• **describe examples of passive and active solar heating, and explain the principles that underlie them (e.g., design of homes to maximize use of winter sunshine)**		
	• **compare and evaluate materials and designs that maximize or minimize heat energy transfer (e.g., design and build a device that minimizes energy transfer, such as an insulated container for hot drinks; evaluate different window coatings for use in a model home)**		
	• explain the operation of technological devices and systems that respond to temperature change (e.g., thermometers, bimetallic strips, thermostatically-controlled heating systems)		
	• describe and interpret the function of household devices and systems for generating, transferring, controlling or removing thermal energy (e.g., describe in general terms the operation of heaters, furnaces, refrigerators and air conditioning devices)		

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3. Apply an understanding of heat and temperature in interpreting natural phenomena and technological devices (continued)	• investigate and describe practical problems in controlling and using thermal energy (e.g., heat losses, excess energy consumption, damage to materials caused by uneven heating, risk of fire)		
4. Analyze issues related to the selection and use of thermal technologies, and explain decisions in terms of advantages and disadvantages for sustainability	• identify and evaluate different sources of heat and the environmental impacts of their use (e.g., identify advantages and disadvantages of fossil fuel use; compare the use of renewable and nonrenewable sources in different applications)		
	• compare the energy consumption of alternative technologies for heat production and use, and identify related questions and issues (e.g., compare the energy required in alternative cooking technologies, such as electric stoves, gas stoves, microwave ovens and solar cookers; identify issues regarding safety of fuels, hot surfaces and combustion products)		
	• identify positive and negative consequences of energy use, and describe examples of energy conservation in their home or community		
SPECIFIC OUTCOMES FOR SKILLS			
Initiating and Planning Ask questions about the relationships between and among observable variables, and plan investigations to address those questions	• identify science-related issues (e.g., identify an economic issue related to heat loss in a building)		
	• identify questions to investigate arising from a problem or issue (e.g., ask a question about the source of cold air in a building, or about ways to prevent cold areas)		
	• phrase questions in a testable form, and clearly define practical problems (e.g., rephrase a general question, such as: "How can we cut heat loss through windows?" to become "What effect would the addition of a plastic layer have on heat loss through window glass?" or "How would the use of double- or triple-paned windows affect heat loss?")		
	• design an experiment, and control the major variables (e.g., design an experiment to evaluate two alternative designs for solar heating a model house)		

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Performing and Recording Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data	• identify data and information that are relevant to a given problem or issue	❄	
	• select and integrate information from various print and electronic sources or from several parts of the same source (e.g., describe current solar energy applications in Canada, based on information from a variety of print and electronic sources)		
	• use instruments effectively and accurately for collecting data and information (e.g., accurately read temperature scales and use a variety of thermometers; demonstrate skill in downloading text, images, and audio and video files on methods of solar heating)		
	• carry out procedures, controlling the major variables (e.g., show appropriate attention to controls in investigations of the insulative properties of different materials)		
Analyzing and Interpreting Analyze qualitative and quantitative data, and develop and assess possible explanations	• compile and display data, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, bar graphs and line graphs (e.g., construct a database to enter, compare and present data on the insulative properties of different materials)		
	• identify, and suggest explanations for, discrepancies in data		
	• identify and evaluate potential applications of findings (e.g., the application of heat transfer principles to the design of homes and protective clothing)		
	• test the design of a constructed device or system (e.g., test a personally-constructed heating or cooling device)		
Communication and Teamwork Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	• communicate questions, ideas, intentions, plans and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language and other means (e.g., use electronic hardware to generate data summaries and graphs of group data, and present these findings)		
	• defend a given position on an issue, based on their findings (e.g., defend the use of a particular renewable or nonrenewable source of heat energy in a particular application)		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning WINTER ELO rows are highlighted
	SPECIFIC OUTCOMES FOR ATTITUDES		
Interest in Science	Show interest in science-related questions and issues, and pursue personal interests and career possibilities within science-related fields (e.g., apply ideas learned in asking and answering questions about everyday phenomena related to heat; show interest in a broad scope of science-related fields in which heat plays a significant role)		
Mutual Respect	Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds (e.g., appreciate Aboriginal home designs of the past and present that use locally-available materials; recognize that science and technology develop in response to global concerns, as well as to local needs; consider more than one factor or perspective when making decisions on STS issues)		
Scientific Inquiry	Seek and apply evidence when evaluating alternative approaches to investigations, problems andissues (e.g., view a situation from different perspectives; propose options and compare them when making decisions or taking action)		
Collaboration	Work collaboratively in carrying out investigations and in generating and evaluating ideas (e.g., choose a variety of strategies, such as active listening, paraphrasing and questioning, in order to understand other points of view; seek consensus before making decisions)		
Stewardship	Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment (e.g., recognize the distinction between renewable and nonrenewable resources and the implications this has for responsible action; objectively identify potential conflicts between responding to human wants and needs and protecting the environment)		
Safety	Show concern for safety in planning, carrying out and reviewing activities (e.g., demonstrate concern for self and others in planning and carrying out experimental activities involving the heating of materials; select safe methods for collecting evidence and solving problems)		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning WINTER ELO rows are highlighted
	UNIT D: STRUCTURES AND FORCES *WINTER/SPRING		
	SPECIFIC OUTCOMES FOR SCIENCE, TECHNOLOGY AND SOCIETY		
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)**		**Find examples (take photos) of frame, shell and frame-and-shell structures in the local community (eg. tipis, canoes, local homes, local buildings); Classify the local structures**
	• **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)**		
2. Investigate and analyze forces within structures, and forces applied to them	• **recognize and use units of force and mass, and identify and measure forces and loads**		
	• identify examples of frictional forces and their use in structures (e.g., friction of a nail driven into wood, friction of pilings or footings in soil, friction of stone laid on stone)		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning WINTER ELO rows are highlighted
2. Investigate and analyze forces within structures, and forces applied to them (continued)	• **identify tension, compression, shearing and bending forces within a structure; and describe how these forces can cause the structure to fail (e.g., identify tensile forces that cause lengthening and possible snapping of a member; identify bending forces that could lead to breakage)**		
	• **analyze a design, and identify properties of materials that are important to individual parts of the structure (e.g., recognize that cables can be used as a component of structures where only tensile forces are involved; recognize that beams are subject to tension on one side and compression on the other; recognize that flexibility is important in some structures)**		
	• **infer how the stability of a model structure will be affected by changes in the distribution of mass within the structure and by changes in the design of its foundation (e.g., infer how the stability of a structure will be affected by increasing the width of its foundation)**		
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**		

Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning WINTER ELO rows are highlighted
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		
SPECIFIC OUTCOMES FOR SKILLS			
Initiating and Planning Ask questions about the relationships between and among observable variables, and plan investigations to address those questions	• identify practical problems (e.g., identify a problem related to the stability of a structure)		
	• propose alternative solutions to a practical problem, select one, and develop a plan (e.g., propose an approach to increasing the stability of a structure)		
	• select appropriate methods and tools for collecting data to solve problems (e.g., use or develop an appropriate method for determining if the mass of a structure is well distributed over its foundation)		
	• formulate operational definitions of major variables and other aspects of their investigations (e.g., define flexibility of a component as the amount of deformation for a given load)		
Performing and Recording Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data	• research information relevant to a given problem		
	• organize data, using a format that is appropriate to the task or experiment (e.g., use a database or spreadsheet for recording the deformation of components under different loads)		
	• carry out procedures, controlling the major variables (e.g., ensure that tests to determine the effect of any one variable are based on changes to that variable only)		
	• use tools and apparatus safely (e.g., select appropriate tools, and safely apply methods for joining materials; use saws and other cutting tools safely)		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning WINTER ELO rows are highlighted
Analyzing and Interpreting Analyze qualitative and quantitative data, and develop and assess possible explanations	• compile and display data, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, bar graphs, line graphs and scatterplots (e.g., plot a graph, showing the deflection of different materials tested under load)		
	• identify and evaluate potential applications of findings (e.g., identify possible applications of materials for which they have studied the properties)		
	• test the design of a constructed device or system (e.g., test and evaluate a prototype design of a foundation for a model building to be constructed on sand)		
	• evaluate designs and prototypes in terms of function, reliability, safety, efficiency, use of materials and impact on the environment		
	• identify and correct practical problems in the way a prototype or constructed device functions		
Communication and Teamwork Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	• communicate questions, ideas, intentions, plans and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language and other means (e.g., produce a work plan, in cooperation with other team members, that identifies criteria for selecting materials and evaluating designs)		
	• work cooperatively with team members to develop and carry out a plan, and troubleshoot problems as they arise		
SPECIFIC OUTCOMES FOR ATTITUDES			
Interest in Science	Show interest in science-related questions and issues, and pursue personal interests and career possibilities within science-related fields (e.g., apply knowledge of structures in interpreting a variety of structures within their home community; ask questions about techniques and materials used, and show an interest in construction and engineering)		
Mutual Respect	Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds (e.g., recognize that a variety of structural forms have emerged fromd ifferent cultures at different times in history)		

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7

Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning WINTER ELO rows are highlighted
Scientific Inquiry	Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues (e.g., report the limitations of their designs; continue working on a problem or research project until the best possible solutions or answers are uncovered)		
Collaboration	Work collaboratively in carrying out investigations and in generating and evaluating ideas (e.g., accept various roles within a group, including that of leadership; remain interested and involved in decision making that requires full-group participation; understand that they may disagree with others but still work in a collaborative manner)		
Stewardship	Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment (e.g., consider the cause-and-effect relationships of personal actions and decisions)		
Safety	Show concern for safety in planning, carrying out and reviewing activities (e.g., readily alter a procedure to ensure the safety of members of the group; carefully manipulate materials, using skills learned in class or elsewhere; listen attentively to safety procedures given by the teacher)		

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Spring

HOW THE SPRING CURRICULUM CHARTS ARE ORGANIZED

The Learning Outcomes that follow from **Science** must be taught during the SPRING season. Learning outcomes must be grounded in Nehiyaw Ways of Knowing and Land Based Learning. Note that all Attitudes and Skills listed at the end of each science unit are important and should be included as part of the unit of study, but are not highlighted as essential because it was inferred that they have been taught in elementary grades or are cross curricular. Science outcomes identified in this chart also cross over from the WINTER season.

These **Science** charts include suggested, although not exhaustive, connections to Nehiyaw Ways of Knowing and Land Based Learning. Throughout the year, teachers will collaborate and generate more/other ideas that will value add to the suggested connections.

Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning SPRING ELO rows are highlighted
	UNIT D: STRUCTURES AND FORCES *WINTER/SPRING		
	SPECIFIC OUTCOMES FOR SCIENCE, TECHNOLOGY AND SOCIETY		
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)**		**Find examples (take photos) of frame, shell and frame-and-shell structures in the local community (eg. tipis, canoes, local homes, local buildings); Classify the local structures**
	• **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)**		

Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning SPRING ELO rows are highlighted
1. Describe and interpret different types of structures encountered in everyday objects, buildings, plants and animals; and identify materials from which they are made (continued)	• **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)**		
2. Investigate and analyze forces within structures, and forces applied to them	• **recognize and use units of force and mass, and identify and measure forces and loads**		
	• identify examples of frictional forces and their use in structures (e.g., friction of a nail driven into wood, friction of pilings or footings in soil, friction of stone laid on stone)		
	• **identify tension, compression, shearing and bending forces within a structure; and describe how these forces can cause the structure to fail (e.g., identify tensile forces that cause lengthening and possible snapping of a member; identify bending forces that could lead to breakage)**		
	• **analyze a design, and identify properties of materials that are important to individual parts of the structure (e.g., recognize that cables can be used as a component of structures where only tensile forces are involved; recognize that beams are subject to tension on one side and compression on the other; recognize that flexibility is important in some structures)**		
	• **infer how the stability of a model structure will be affected by changes in the distribution of mass within the structure and by changes in the design of its foundation (e.g., infer how the stability of a structure will be affected by increasing the width of its foundation)**		
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)**		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning SPRING ELO rows are highlighted
3. Investigate and analyze the properties of materials used in structures (continued)	• **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		
SPECIFIC OUTCOMES FOR SKILLS			
Initiating and Planning Ask questions about the relationships between and among observable variables, and plan investigations to address those questions	• identify practical problems (e.g., identify a problem related to the stability of a structure)		
	• propose alternative solutions to a practical problem, select one, and develop a plan (e.g., propose an approach to increasing the stability of a structure)		
	• select appropriate methods and tools for collecting data to solve problems (e.g., use or develop an appropriate method for determining if the mass of a structure is well distributed over its foundation)		
	• formulate operational definitions of major variables and other aspects of their investigations (e.g., define flexibility of a component as the amount of deformation for a given load)		

Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning SPRING ELO rows are highlighted
Performing and Recording Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data	• research information relevant to a given problem		
	• organize data, using a format that is appropriate to the task or experiment (e.g., use a database or spreadsheet for recording the deformation of components under different loads)		
	• carry out procedures, controlling the major variables (e.g., ensure that tests to determine the effect of any one variable are based on changes to that variable only)		
	• use tools and apparatus safely (e.g., select appropriate tools, and safely apply methods for joining materials; use saws and other cutting tools safely)		
Analyzing and Interpreting Analyze qualitative and quantitative data, and develop and assess possible explanations	• compile and display data, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, bar graphs, line graphs and scatterplots (e.g., plot a graph, showing the deflection of different materials tested under load)		
	• identify and evaluate potential applications of findings (e.g., identify possible applications of materials for which they have studied the properties)		
	• test the design of a constructed device or system (e.g., test and evaluate a prototype design of a foundation for a model building to be constructed on sand)		
	• evaluate designs and prototypes in terms of function, reliability, safety, efficiency, use of materials and impact on the environment		
	• identify and correct practical problems in the way a prototype or constructed device functions		
Communication and Teamwork Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	• communicate questions, ideas, intentions, plans and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language and other means (e.g., produce a work plan, in cooperation with other team members, that identifies criteria for selecting materials and evaluating designs)		
	• work cooperatively with team members to develop and carry out a plan, and troubleshoot problems as they arise		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning SPRING ELO rows are highlighted
	SPECIFIC OUTCOMES FOR ATTITUDES		
Interest in Science	Show interest in science-related questions and issues, and pursue personal interests and career possibilities within science-related fields (e.g., apply knowledge of structures in interpreting a variety of structures within their home community; ask questions about techniques and materials used, and show an interest in construction and engineering)		
Mutual Respect	Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds (e.g., recognize that a variety of structural forms have emerged fromd ifferent cultures at different times in history)		
Scientific Inquiry	Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues (e.g., report the limitations of their designs; continue working on a problem or research project until the best possible solutions or answers are uncovered)		
Collaboration	Work collaboratively in carrying out investigations and in generating and evaluating ideas (e.g., accept various roles within a group, including that of leadership; remain interested and involved in decision making that requires full-group participation; understand that they may disagree with others but still work in a collaborative manner)		
Stewardship	Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment (e.g., consider the cause-and-effect relationships of personal actions and decisions)		
Safety	Show concern for safety in planning, carrying out and reviewing activities (e.g., readily alter a procedure to ensure the safety of members of the group; carefully manipulate materials, using skills learned in class or elsewhere; listen attentively to safety procedures given by the teacher)		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning SPRING ELO rows are highlighted
UNIT E: PLANET EARTH			
SPECIFIC OUTCOMES FOR SCIENCE, TECHNOLOGY AND SOCIETY			
1. Describe and demonstrate methods used in the scientific study of Earth and in observing and interpreting its component materials	• **investigate and interpret evidence that Earth's surface undergoes both gradual and sudden change (e.g., recognize earthquakes, volcanoes and landslides as examples of sudden change; recognize glacial erosion and river erosion as examples of gradual/incremental change)**		
	• interpret models that show a layered structure for Earth's interior; and describe, in general terms, evidence for such models		
	• **identify and explain the purpose of different tools and techniques used in the study of Earth (e.g., describe and explain the use of seismographs and coring drills, as well as tools and techniques for the close examination of rocks; describe methods used in oil and gas exploration)**		
	• **explain the need for common terminology and conventions in describing rocks and minerals, and apply suitable terms and conventions in describing sample materials (e.g., use common terms in describing the lustre, transparency, cleavage and fracture of rocks and minerals; apply the Mohs' scale in describing mineral hardness)**		
2. Identify evidence for the rock cycle, and use the rock cycle concept to interpret and explain the characteristics of particular rocks	• distinguish between rocks and minerals		
	• describe characteristics of the three main classes of rocks—igneous, sedimentary and metamorphic—and describe evidence of their formation (e.g., describe evidence of igneous rock formation, based on the study of rocks found in and around volcanoes; describe the role of fossil evidence in interpreting sedimentary rock)		
	• **describe local rocks and sediments, and interpret ways they may have formed**		
	• **investigate and interpret examples of weathering, erosion and sedimentation**		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning SPRING ELO rows are highlighted
3. Investigate and interpret evidence of major changes in landforms and the rock layers that underlie them	• investigate and interpret patterns in the structure and distribution of mountain formations (e.g., describe and interpret mountain formations of the North American cordillera)		
	• interpret the structure and development of fold and fault mountains		
	• describe evidence for crustal movement, and identify and interpret patterns in these movements (e.g., identify evidence of earthquakes and volcanic action along the Pacific Rim; identify evidence of the movement of the Pacific plate relative to the North American plate)		
	• **identify and interpret examples of gradual/incremental change, and predict the results of those changes over extended periods of time (e.g., identify evidence of erosion, and predict the effect of erosional change over a year, century and millennium; project the effect of a given rate of continental drift over a period of one million years)**		**Focus on local examples**
4. Describe, interpret and evaluate evidence from the fossil record	• describe the nature of different kinds of fossils, and identify hypotheses about their formation (e.g., identify the kinds of rocks where fossils are likely to be found; identify the portions of living things most likely to be preserved; identify possible means of preservation, including replacement of one material by another and formation of molds and casts)		
	• explain and apply methods used to interpret fossils (e.g., identify techniques used for fossil reconstruction, based on knowledge of current living things and findings of related fossils; identify examples of petrified wood and bone)		
	• describe patterns in the appearance of different life forms, as indicated by the fossil record (e.g., construct and interpret a geological time scale; and describe, in general terms, the evidence that has led to its development)		
	• identify uncertainties in interpreting individual items of fossil evidence; and explain the role of accumulated evidence in developing accepted scientific ideas, theories and explanations		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning SPRING ELO rows are highlighted
	SPECIFIC OUTCOMES FOR SKILLS		
Initiating and Planning Ask questions about the relationships between and among observable variables, and plan investigations to address those questions	• identify questions to investigate (e.g., How are rocks formed?)		
	• define and delimit questions to facilitate investigation (e.g., ask a question about a sample group of rocks from a specific region, or about a specific type of rock or rock formation)		
	• state a prediction and a hypothesis based on background information or an observed pattern of events (e.g., predict where an outcrop of a given rock will appear, based on observations at nearby sites)		
	• formulate operational definitions of major variables and other aspects of their investigations (e.g., define hardness by reference to a set of mineral samples, or by reference to the Mohs' scale of hardness)		
Performing and Recording Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data	• carry out procedures, controlling the major variables		
	• estimate measurements (e.g., estimate the thickness of sedimentary layers)		
	• research information relevant to a given question (e.g., research information regarding the effect of acid rain on the rate of rock weathering)		
	• select and integrate information from various print and electronic sources or from several parts of the same source (e.g., demonstrate proficiency in uploading and downloading text, image, audio		
	• organize data, using a format that is appropriate to the task or experiment (e.g., use diagrams to show the shape and thickness of different layers in a rock outcrop)		
Analyzing and Interpreting Analyze qualitative and quantitative data, and develop and assess possible explanations	• use or construct a classification key (e.g., apply a classification key to identify a group of rocks from a local gravel yard)		
	• interpret patterns and trends in data, and infer and explain relationships among the variables (e.g., interpret example graphs of seismic data, and explain the lag time between data received at different locations)		
	• predict the value of a variable, by interpolating or extrapolating from data (e.g., determine, in a stream table study, the quantity of sediment carried over a half-hour period, then extrapolate the amount that would be carried if the time were extended to a day, month, year or millennium)		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning SPRING ELO rows are highlighted
Analyzing and Interpreting Analyze qualitative and quantitative data, and develop and assess possible explanations (continued)	• identify and suggest explanations for discrepancies in data (e.g., suggest explanations for an igneous rock being found in a sedimentary formation)		
	• identify new questions and problems that arise from what was learned (e.g., identify new questions that arise after learning about plate tectonics)		
Communication and Teamwork Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	• work cooperatively with team members to develop and carry out a plan, and troubleshoot problems as they arise (e.g., each group member is assigned a task to investigate a particular mineral, and the results are pooled in a common data table)		
	• evaluate individual and group processes used in planning, problem solving, decision making and completing a task (e.g., evaluate the relative success and scientific merits of an Earth science field trip organized and guided by themselves)		
SPECIFIC OUTCOMES FOR ATTITUDES			
Interest in Science	Show interest in science-related questions and issues, and pursue personal interests and career possibilities within science-related fields (e.g., recognize potential careers related to Earth science fields; pursue interests in rocks, through museum visits, personal collections or recreational reading)		
Mutual Respect	Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds (e.g., appreciate the idea of "Mother Earth," and recognize different forms of this idea developed by different cultures; recognize the role of legend and myth in conveying understandings about Earth; recognize that scientific ideas about Earth have developed over time)		
Scientific Inquiry	Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues (e.g., critically evaluate inferences and conclusions, basing their arguments on facts rather than opinions; identify evidence to support ideas; take the time to accurately gather evidence and use instruments carefully)		

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Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold; Others are *need to know* or *worth being familiar with*	Season	Nehiyaw Ways of Knowing and Land Based Learning SPRING ELO rows are highlighted
Collaboration	Work collaboratively in carrying out investigations and in generating and evaluating ideas (e.g., listen to the ideas and points of view of others; consider alternative ideas and interpretations suggested by members of the group)		
Stewardship	Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment (e.g., recognize that fossils are a part of public heritage and that they should not be defaced or removed from where they are found; consider the needs of other people and the precariousness of the environment when making decisions and taking action)		
Safety	Show concern for safety in planning, carrying out and reviewing activities (e.g., wear safety goggles when testing the cleavage or fracture of rocks; ensure the proper disposal of materials)		

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