




 Big Idea, Major Concepts, GLOs	Specific Learning Outcomes ELOs are bold	Season	Nehiyaw Ways of Knowing
SCIENCE INQUIRY			
GENERAL LEARNER EXPECTATION 6-1 Design and carry out an investigation in which variables are identified and controlled, and that provides a fair test of the question being investigated.			
GENERAL LEARNER EXPECTATION 6-2 Recognize the importance of accuracy in observation and measurement; and apply suitable methods to record, compile, interpret and evaluate observations and measurements.			
Focus	<ul style="list-style-type: none"> ask questions that lead to exploration and investigation 		
	<ul style="list-style-type: none"> identify one or more possible answers to questions by stating a prediction or a hypothesis 		
Explore and Investigate	<ul style="list-style-type: none"> identify, with guidance, ways of finding answers to given questions 		
	<ul style="list-style-type: none"> plan and carry out procedures that comprise a fair test 		
	<ul style="list-style-type: none"> identify variables: <ul style="list-style-type: none"> – identify the variable to be manipulated – identify variables to be held constant – identify the variable that will be observed (responding variable) 		
	<ul style="list-style-type: none"> select appropriate materials and identify how they will be used 		
	<ul style="list-style-type: none"> modify the procedures as needed 		
	<ul style="list-style-type: none"> work individually or cooperatively in planning and carrying out procedures identify sources of information and ideas and demonstrate skill in accessing them. Sources may include library, classroom, community and computerbased resources 		
Reflect and Interpret	<ul style="list-style-type: none"> communicate effectively with group members in sharing and evaluating ideas, and assessing progress 		
	<ul style="list-style-type: none"> record observations and measurements accurately, using a chart format where appropriate. Computer resources may be used for record keeping and for display and interpretation of data 		
	<ul style="list-style-type: none"> evaluate procedures used and identify possible improvements 		

6

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Reflect and Interpret	<ul style="list-style-type: none"> state an inference, based on results. The inference will identify a cause and effect relationship that is supported by observations identify possible applications of what was learned identify new questions that arise from what was learned. 		
PROBLEM SOLVING THROUGH TECHNOLOGY			
 GENERAL LEARNER EXPECTATION 6-3 Design and carry out an investigation of a practical problem, and develop a possible solution.			
Focus	<ul style="list-style-type: none"> identify problems to be solved and the purpose(s) of the problem-solving activity: What problem(s) are we trying to solve? What conditions must be met? What controls are required? How will we know that we have done what we set out to do? 		
Explore and Investigate	<ul style="list-style-type: none"> identify one or more possible approaches to solving the problem and plan, with guidance, a set of steps to follow select appropriate materials and identify how they will be used attempt a variety of strategies and modify procedures, as needed (troubleshoot problems) work individually or cooperatively in planning and carrying out procedures identify sources of information and ideas and access information and ideas from those sources. Sources may include library, classroom, community and computer-based resources 		
Reflect and Interpret	<ul style="list-style-type: none"> communicate with group members to share and evaluate ideas, and assess progress evaluate the procedures used to solve the problem and identify possible improvements 		

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Reflect and Interpret	<ul style="list-style-type: none"> evaluate a design or product, based on a given set of questions or criteria. The criteria/questions may be provided by the teacher or developed by the students. Example criteria include: <ul style="list-style-type: none"> – effectiveness—Does it work? – reliability—Does it work every time? – durability—Does it stand up to repeated use? – effort—Is it easy to construct? Is it easy to use? – safety—Are there any risks of hurting oneself in making it or using it? – use of materials—Can it be made cheaply with available materials? Does it use recycled materials, and can the materials be used again? – effect on environments – benefit to society identify positive and negative impacts that may arise and potential risks that need to be monitored: What good effects and what bad effects could this solution have? What would we need to look for to be sure that it is working as intended? identify new applications for the design or problem solution. 		
ATTITUDES			
 GENERAL LEARNER EXPECTATION 6–4 Demonstrate positive attitudes for the study of science and for the application of science in responsible ways.			
	Students will show growth in acquiring and applying the following traits: <ul style="list-style-type: none"> curiosity confidence in personal ability to explore materials and learn by direct study inventiveness perseverance: staying with an investigation over a sustained period of time appreciation of the value of experience and careful observation a willingness to work with others and to consider their ideas a sense of responsibility for actions taken respect for living things and environments, and commitment for their care 		


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Season
Nehiyaw Ways of Knowing
TOPIC A: AIR AND AERODYNAMICS (SEPTEMBER-OCTOBER)
GENERAL LEARNER EXPECTATION 6-5

Describe properties of air and the interactions of air with objects in flight.



- Look at the way birds fly, how they use their wings to fly; predators vs non predators

1. Provide evidence that air takes up space and exerts pressure, and identify examples of these properties in everyday applications.

2. Provide evidence that air is a fluid and is capable of being compressed, and identify examples of these properties in everyday applications.

3. Describe and demonstrate instances in which air movement across a surface results in lift— Bernoulli's principle.

4. Recognize that in order for devices or living things to fly, they must have sufficient lift to overcome the downward force of gravity.


- Look at the way birds fly, how they use their wings to fly; predators vs non predators; constructing paper planes and kites and testing them/refining them

5. Identify adaptations that enable birds and insects to fly.




- Examine why certain birds have wings and still can not fly and compare to local birds; compare how a large insect (e.g., dragon fly) flies vs a smaller insect (mosquito)




6. Describe the means of propulsion for flying animals and for aircraft.





7. Recognize that streamlining reduces drag, and predict the effects of specific design changes on the drag of a model aircraft or aircraft components.

8. Recognize that air is composed of different gases, and identify evidence for different gases. Example evidence might include: effects on flames, the "using up" of a particular gas by burning or rusting, animal needs for air exchange.


- Examine the need for air to light a fire and extinguish a fire; how we use different woods for burning; look at the ways some of the require less oxygen aquatic animals and how some land animals require more; look at algae blooms and winter kill.

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	9. Interpret and explain: <ul style="list-style-type: none"> the reading on a household electrical meter efficiency labels on electrical appliances. 10. Draw and interpret, with guidance, circuit diagrams that include symbols for switches, power sources, resistors, lights and motors.		
TOPIC B: FLIGHT (END OF MARCH - JUNE)			
GENERAL LEARNER EXPECTATION 6-6 Construct devices that move through air, and identify adaptations for controlling flight.			<ul style="list-style-type: none"> Archery; construct kites and paper planes and adapt/modify them to see affect on flight; examine questions such as: Does wifi have flight and how would you find out?
	1. Conduct tests of a model parachute design, and identify design changes to improve the effectiveness of the design. 2. Describe the design of a hot-air balloon and the principles by which its rising and falling are controlled. 3. Conduct tests of glider designs; and modify a design so that a glider will go further, stay up longer or fly in a desired way; e.g., fly in a loop, turn to the right. 4. Recognize the importance of stability and control to aircraft flight; and design, construct and test control surfaces. 5. Apply appropriate vocabulary in referring to control surfaces and major components of an aircraft. This vocabulary should include: wing, fuselage, vertical and horizontal stabilizers, elevators, ailerons, rudder. 6. Construct and test propellers and other devices for propelling a model aircraft. 7. Describe differences in design between aircraft and spacecraft, and identify reasons for the design differences. Note: Model aircraft or rockets may be constructed and used as part of this topic. It is recommended that these models be simple devices of the student's construction, not prefabricated models. Propulsion of rockets by chemical fuels is neither required nor recommended, due to safety considerations.		<ul style="list-style-type: none"> Construct kites and paper planes and adapt/modify them to see affect on flight; Paul Neethling flight simulator.

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TOPIC C: SKY SCIENCE (WINTER/LATE FALL JANUARY-MID MARCH)			
GENERAL LEARNER EXPECTATION 6-7 Observe, describe and interpret the movement of objects in the sky; and identify pattern and order in these movements.			<ul style="list-style-type: none"> Northern lights; constellations and how they move and how we have different constellations throughout the year; First Nations names/stories for constellations; rotation and orbits; Wildred Buck - a blow up planetarium is a resource that might be accessed - he tells constellation stories); KTCEA chart of Cree Constellations and their names and locations (see Jason)
1. Recognize that the Sun and stars emit the light by which they are seen and that most other bodies in space, including Earth's Moon, planets and their moons, comets, and asteroids, are seen by reflected light.			
2. Describe the location and movement of individual stars and groups of stars (constellations) as they move through the night sky.			
3. Recognize that the apparent movement of objects in the night sky is regular and predictable, and explain how this apparent movement is related to Earth's rotation.			
4. Understand that the Sun should never be viewed directly, nor by use of simple telescopes or filters, and that safe viewing requires appropriate methods and safety precautions.			
5. Construct and use a device for plotting the apparent movement of the Sun over the course of a day; e.g., construct and use a sundial or shadow stick.			<ul style="list-style-type: none"> Using the sun to find direction; look at sundials and how other First Nations had sundials built on the land (Blackfoot)
6. Describe seasonal changes in the length of the day and night and in the angle of the Sun above the horizon.			<ul style="list-style-type: none"> Look at/graph over time the long days of summer and short days of winter and connect to position of the sun; rotation and orbit.
7. Recognize that the Moon's phases are regular and predictable, and describe the cycle of its phases.			

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	8. Illustrate the phases of the Moon in drawings and by using improvised models. An improvised model might involve such things as a table lamp and a sponge ball.		<ul style="list-style-type: none"> Cultural camp looks at the phases of the moon and stories surrounding the moon.
	9. Recognize that the other eight known planets, which revolve around the Sun, have characteristics and surface conditions that are different from Earth; and identify examples of those differences.		
	10. Recognize that not only Earth, but other planets, have moons; and identify examples of similarities and differences in the characteristics of those moons.		
	11. Identify technologies and procedures by which knowledge, about planets and other objects in the night sky, has been gathered.		
	12. Understand that Earth, the Sun and the Moon are part of a solar system that occupies only a tiny part of the known universe.		
TOPIC D: EVIDENCE AND INVESTIGATION (ALL YEAR)			
	GENERAL LEARNER EXPECTATION 6–8 Apply observation and inference skills to recognize and interpret patterns and to distinguish a specific pattern from a group of similar patterns.		<ul style="list-style-type: none"> Animal tracks; tracking animal behaviour; phases of the moon; weather patterns; (connect to the other science units)
	GENERAL LEARNER EXPECTATION 6–9 Apply knowledge of the properties and interactions of materials to the investigation and identification of a material sample.		
	1. Recognize evidence of recent human activity, and recognize evidence of animal activity in a natural outdoor setting.		
	2. Observe a set of footprints, and infer the direction and speed of travel.		<ul style="list-style-type: none"> Cultural camps
	3. Recognize that evidence found at the scene of an activity may have unique characteristics that allow an investigator to make inferences about the participants and the nature of the activity, and give examples of how specific evidence may be used.		


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4. Investigate evidence and link it to a possible source; e.g., by:
- classifying footprints, tire prints and soil samples from a variety of locations
 - analyzing the ink from different pens, using paper chromatography
 - analyzing handwriting samples to identify the handwriting of a specific person
 - comparing samples of fabric
 - classifying fingerprints collected from a variety of surfaces



- **Cultural camps**

TOPIC E: TREES AND FORESTS (ALL YEAR)
GENERAL LEARNER EXPECTATION 6-10

Describe characteristics of trees and the interaction of trees with other living things in the local environment.



- **Nature walks; cultural camps; looking at where certain medicinal plants grow in relation to trees; categorizing different types of trees**

1. Identify reasons why trees and forests are valued. Students meeting this expectation should be aware that forests serve as habitat for a variety of living things and are important to human needs for recreation, for raw materials and for a life-supporting environment.



- **Valued for food, oxygen, shelter, animal survival - concepts are reinforced at LBL camps throughout the year**

2. Describe kinds of plants and animals found living on, under and among trees; and identify how trees affect and are affected by those living things.

- **Concepts are introduced at LBL camps and reinforced/followed up in the classroom**

3. Describe the role of trees in nutrient cycles and in the production of oxygen.




4. Identify general characteristics that distinguish trees from other plants, and characteristics that distinguish deciduous from coniferous trees.

5. Identify characteristics of at least four trees found in the local environment. Students should be familiar with at least two deciduous trees and two coniferous trees. Examples should include native species, such as spruce, birch, poplar, and pine and cultivated species, such as elm and crab apple.



- **Concepts are introduced at LBL camps and reinforced/followed up in the classroom**

6. Describe and classify leaf shapes, leaf arrangements, branching patterns and the overall form of a tree.

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	7. Interpret the growth pattern of a young tree, distinguishing this year's growth from that of the previous year and from the year before that. Students meeting this expectation should recognize differences in colouration and texture of new growth and old growth, and locate scars that separate old and new growth.		
	8. Identify human uses of forests, and compare modern and historical patterns of use.		<ul style="list-style-type: none"> • Firewood; buildings; furniture; tipis; cabins; smoke racks; smoking meats; shade; canoes - specific trees uses. For forest in general: hunting; gathering, etc. Listen to Elder stories or read traditional stories about forest use.
	9. Identify human actions that enhance or threaten the existence of forests.		
	10. Identify an issue regarding forest use, identify different perspectives on that issue, and identify actions that might be taken.		<ul style="list-style-type: none"> • Examples: the use of prescribed burning to keep the forests healthy and prevent huge forest fires