Grade 4
Example for Place-Based Learning

GRADE 4
Big Ideas for Science

B BIOLOGY

All living things sense and respond to their environment.

C CHEMISTRY

Matter has mass, takes up space, and can change phase.

P PHYSICS

Energy can be transformed.

E EARTH SCIENCES

The motion of the Earth and moon cause observable patterns that affect living and non-living systems.

PLACE: local water body, or school or community garden or forest

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1 Experience Place

TONE: open-minded, unburdened, curious, playful

Self-exploring through the student's individual ways of knowing, a few examples might be:

- Investigating habitat looking for invertebrates
- Exploring the community of life in the ecosystem identifying some of the members and the non-living parts
- Feeling the weather in this place
- Feeling the moisture or dryness in this place
- Visiting this place throughout the seasons
- Partaking in play, poetry and water colours in this place

2 Questioning and Predicting

TONE: more focused, curious, reflective

B What are some characteristics of the place you observed the invertebrate(s), i.e. how would you describe the habitat where you found the invertebrate(s)? What could this tell you about the needs of the invertebrate(s)? How do you think they sense their environment for their needs? And how might they respond? Who else lives in this habitat or nearby?

C What is the phase of H_2O in this habitat? How does it get here? Where does it go? Can it change phase and if so, how? What are the common seasonal phases of H_2O in this ecosystem? How much space does water take up? How much does it weigh? What weighs more: water, snow or ice? What are the implications for life in this place with different phases of water?

P In this habitat, where does the food chain start? Who is the top predator? Etc–as given in existing example

E Do we have different activities for different times of the year? Is life in the ecosystem different during different seasons? How so? What causes the different weather during the course of the year? What are seasons and how do they occur?

Predicting: To each of the questions/inquiries above, consider what the answer(s) could be.

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3 Planning and Conducting

TONE: creative, restrained, calculating, collaborative

How could the question be investigated to test the prediction? How would we know if the answer is correct or incorrect? Could the answer be discovered by observation alone or would we want to consider other sources of information? Which sources?

- B Observe invertebrates in their natural habitat; use eye loupes/magnifiers for close-up observations; treat invertebrates respectfully; create and run some investigations to test how you think they sense their environment, and to test their response to a change in their environment - consider dark and bright conditions/ wet and dry/ upside down and right side up/ drops of sugar water offered as food/ another invertebrate.
- C Observe invertebrates in their natural habitat through the seasons; observe water (in any phase) in this environment through the seasons; use weigh scales to measure mass (ice, snow), or a rain gauge (rainfall), or moisture (if environment includes soil).
- P Investigate, through observation and research: where the food chain for the ecosystem starts; who the top predator is; how the energy is transferred through the chain or web; what the original energy source for a plant to grow is; how energy moves through the food chain.
- E Conduct a poll of fellow students in the classroom about whether they have different activities at different times of the year. Observe and record the activity of invertebrates in the ecosystem through the seasons. Research what causes seasons on Earth. Investigate the local First Peoples' calendar and use story to discover their round of activities through the year. Refer to A*uthentic First Peoples Resource,* also I*n Our Own Words* (both at www.fnesc.ca). Study a moon calendar; Wsanec 13 moon calendar, or Gitxsan Moons.

4 Processing and analyzing data and information

TONE: observant, methodical

Compare results with predictions, suggest possible reasons for findings.

- B Make a chart of the observations with stimulus on one side and the response by the invertebrate on the other, listing the different stimuli and respective responses. This could be drawn also.
- C Graph the weights of the different phases of water, or the soil moisture (wet, dry);
- P Draw a food chain for the ecosystem that starts with sunlight and includes the invertebrate. Show where energy is transformed. i.e. between each connection point. For example: sunlight to plant matter = solar energy transformed into chemical energy; plant to animal (herbivore); animal to animal (carnivore); decomposers (energy being reduced and released as nutrients to other life).
- E Graph the results of the student poll. List invertebrate activity/abundance to season.
  Explain how the seasons are created: list three factors. Draw your own calendar of activities throughout the season. How is it different from the First People's calendar? What does it tell you about the First People's connection to nature, about where food comes from and about where supplies come from?

5 Evaluating

TONE: discerning, reflective, interdependent, collaborative

B Share the results with a partner, with a group of four, whole class discussion and comparison of results.

C Reflect on whether the instruments available were adequate to measure the different weights; reflect on the results as it relates to differences in unit mass with different phases of water; or, how water (+ or -) changes the mass of a soil.

P Consider a simple food chain with a plant, a herbivore and a carnivore. Create a drawing of this with examples of plants and animals you know. A general principle is that each time the energy is transferred from one level to the next, 90% of the original energy being eaten is transformed into other energy and leaves the food chain as heat, urine, & feces, leaving only 10% of the original energy to go into animal growth. Using this principle let's apply it to the simple food chain. Assume the plant represents 10 units of energy. How much would the herbivore receive to grow with? (i.e. 10% of 10) How much would the carnivore receive? (i.e. 10% of 10% of 10)

E How is your seasonal calendar of activities different from the First People's? What does this tell you about the First People's connection to nature, about where food comes from and where supplies come from? How was the moon important?

6 Applying and Innovating

TONE: reative, open-minded, interconnected, engaging

Create a fictitious invertebrate complete with shelter, food and survival needs:

B Create an imaginary invertebrate that gets introduced into a local water body, forest or the school garden. Show how it could change the environment for the other species there and how they sense and respond to this change in their environment. There is always change going on in the environment, in the world in which we live. Sometimes the changes brought on by introduced species are harmful and sometimes they work out ok, but there is always change. Consider a real scenario, such as the accidental introduction of zebra mussels into freshwater lakes, or the more benign if not favourable introduction of Japanese oysters to the west coast of BC. Some introductions are done intentionally but always there is change in the environment to which they were introduced. To extend this learning, consider getting involved with a local community action to remove an invasive species (a species new to an area with harmful impacts on the local ecosystem)

C Detail the space the fictitious invertebrate will take up as matter, and how it will or will not change the ecosystem and if and how it will change phase itself.

P **1. Create a food chain with you in it.** Where are you in the chain? (Omnivores eat plant and animal matter; vegetarians eat only plants).

2. Problem solving: Imagine in the whole world there are only 100 units of plant food for us. And we need 10 units of food to feed everyone on the planet. Remembering the principle that with each energy transfer between eating levels only 10% of the energy is transferred, what would we need to be eating, plants or animals?

3. Draw your favourite food. Now trace it back all the way to the sun and rain, including all the links in the food chain. Consider all the energy transfers and transformations in your chain and how much energy is required to create your favourite food.

E Create a moon journal, watching and depicting the moon for one month. Could be as simple as logging the daily phases of the moon, or more detailed following the lines of *Moon Journals: Writing, Art and Inquiry Through Focused Nature study. 1997 Joni Chancer.*

7 Communicating

TONE: confident, engaging, interpretive, expressive, sensory, using technology

B Create a mind map or web of an invertebrate and its environment.

C Draw a diagram of the different phases of water within the water cycle.

P Use digital technology to show different kinds of energy in a local food chain.

E Express local original First People's stories of the seasons. Display moon journals.