

BIG IDEAS

Plants and animals have observable features.

Humans interact with matter every day through familiar materials.

The motion of objects depends on their properties.

Daily and seasonal changes affect all living things.

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Questioning and predicting</p> <ul style="list-style-type: none"> • Demonstrate curiosity and a sense of wonder about the world • Observe objects and events in familiar contexts • Ask simple questions about familiar objects and events <p>Planning and conducting</p> <ul style="list-style-type: none"> • Make exploratory observations using their senses • Safely manipulate materials • Make simple measurements using non-standard units <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • Recognize First Peoples stories (including oral and written narratives), songs, and art, as ways to share knowledge • Discuss observations • Represent observations and ideas by drawing charts and simple pictographs <p>Applying and innovating</p> <ul style="list-style-type: none"> • Take part in caring for self, family, classroom and school through personal approaches • Transfer and apply learning to new situations • Generate and introduce new or refined ideas when problem solving <p>Communicating</p> <ul style="list-style-type: none"> • Share observations and ideas orally • Express and reflect on personal experiences of place 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • basic needs of plants and animals • adaptations of local plants and animals • local First Peoples uses of plants and animals • properties of familiar materials • effects of pushes/pulls on movement • effects of size, shape, and materials on movement • weather changes • seasonal changes • living things make changes to accommodate daily and seasonal cycles • First Peoples knowledge of seasonal changes

Big Ideas – Elaborations

Sample questions to support inquiry with students:

Plants and animals have observable features.

- How do the different features of plants and animals help them meet their basic needs?
- What basic needs do plants and animals have in common?
- What are your basic needs?

Humans interact with matter every day through familiar materials.

- What is matter?
- How do you interact with matter?
- What qualities do different forms of matter have?

The motion of objects depends on their properties.

- How can you make objects move?
- How does the shape or size of an object affect the object's movement?
- How does the material the object is made of affect the object's movement?

Daily and seasonal changes affect all living things.

- What daily and seasonal changes can you see or feel?
- How are plants and animals affected by daily and seasonal changes?

Curricular Competencies – Elaborations

- **Questioning and predicting:** Patterns are natural configurations, designs, arrangements or sequences. Many patterns indicate an underlying scientific principle or unifying idea. People identify patterns and look for relationships behind the patterns they find. They use this information to extend their understanding.

Key questions about patterns:

- What patterns do you see in plant life in your local environment?
- What weather patterns can you observe?

- **place:** Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity. The connection between people and place is foundational to First Peoples perspectives of the world.

Key questions about place:

- What is place?
- What are some ways in which people experience place?
- How can you gain a sense of place in your local environment?
- How can you share your observations and ideas about living things in your local environment to help someone else learn about place?

Content – Elaborations

- **basic needs:** include habitat — food, water, shelter, and space
- **adaptations:** may include structural features or behaviours that allow organisms to survive
- **plants:** features may include roots, stems, leaves, flowers, seeds
- **animals:** features may include shape, size, feet, teeth, body covering, eyes, ears
- **local First Peoples uses:** First Peoples practice and knowledge of plant and animal use (e.g., local berries or food, plants and animals, conservation of resources)
- **properties:** colour, texture (smooth or rough), flexibility (bendable or stretchable), hardness, lustre (shiny or dull), absorbency, etc.
- **familiar materials:** fabric, wood, plastic, glass, metal/foil, sand, etc.
- **effects of pushes/pulls:** how things move (e.g., bounce, roll, slide)
- **weather:**
 - temperature: cold, hot, cool, warm
 - cloud cover: clear, cloudy, partly cloudy, foggy
 - precipitation: rain, snow, hail, freezing rain
 - wind: calm, breezy, windy
- **seasonal changes:**
 - seasons: spring, summer, fall, winter
 - plant life cycle
- **living things make changes:** living things may make physical and behavioural changes to survive in different conditions (e.g., migration, hibernation, etc.)

BIG IDEAS

Living things have features and behaviours that help them survive in their environment.

Matter is useful because of its properties.

Light and sound can be produced and their properties can be changed.

Observable patterns and cycles occur in the local sky and landscape.

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Questioning and predicting</p> <ul style="list-style-type: none"> • Demonstrate curiosity and a sense of wonder about the world • Observe objects and events in familiar contexts • Ask questions about familiar objects and events • Make simple predictions about familiar objects and events <p>Planning and conducting</p> <ul style="list-style-type: none"> • Make and record observations • Safely manipulate materials to test ideas and predictions • Make and record simple measurements using informal or non-standard methods <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • Recognize First Peoples stories (including oral and written narratives), songs, and art, as ways to share knowledge • Sort and classify data and information using drawings, pictographs and provided tables • Compare observations with predictions through discussion • Identify simple patterns and connections <p>Evaluating</p> <ul style="list-style-type: none"> • Compare observations with those of others • Consider some environmental consequences of their actions 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • classification of living and non-living things • names of local plants and animals • structural features of living things in the local environment • behavioural adaptations of animals in the local environment • specific properties of materials allow us to use them in different ways • natural and artificial sources of light and sound • properties of light and sound depend on their source and the objects with which they interact • common objects in the sky • the knowledge of First Peoples <ul style="list-style-type: none"> – shared First Peoples knowledge of the sky – local First Peoples knowledge of the local landscape, plants and animals – local First Peoples understanding and use of seasonal rounds • local patterns that occur on Earth and in the sky

Learning Standards (continued)

Curricular Competencies	Content
<p>Applying and innovating</p> <ul style="list-style-type: none"> • Take part in caring for self, family, classroom and school through personal approaches • Transfer and apply learning to new situations • Generate and introduce new or refined ideas when problem solving <p>Communicating</p> <ul style="list-style-type: none"> • Communicate observations and ideas using oral or written language, drawing, or role-play • Express and reflect on personal experiences of place 	

Big Ideas – Elaborations	SCIENCE Grade 1
<p><i>Sample questions to support inquiry with students:</i></p> <p>Living things have features and behaviours that help them survive in their environment.</p> <ul style="list-style-type: none"> • How do local plants and animals depend on their environment? • How do plants and animals use their features to respond to stimuli in their environments? • How do plants and animals adapt when their basic needs are not being met? <p>Matter is useful because of its properties.</p> <ul style="list-style-type: none"> • What makes the properties of matter useful? • How do the properties of materials help connect to the function of materials? <p>Light and sound can be produced and their properties can be changed.</p> <ul style="list-style-type: none"> • How can you explore the properties of light and sound? • What discoveries did you make? <p>Observable patterns and cycles occur in the local sky and landscape.</p> <ul style="list-style-type: none"> • What kinds of patterns in the sky and landscape are you aware of? • How do patterns and cycles in the sky and landscape affect living things? 	

Curricular Competencies – Elaborations

- **Questioning and predicting:** Form and function: Form and function refer to something being designed, structured or shaped in a way that will help it perform a certain function or functions. For example, the fins of fish help them propel themselves through the water. The human skeleton provides protection for organs, and support for muscles, and allows people to stand upright. Science recognizes this important relationship between form and function.

Key questions about form and function:

- What structural features of plants and animals in your local environment help those plants and animals to function well?
- How do the properties of natural materials (e.g., wood) help determine useful functions for the materials?

- **place:** Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity. The connection between people and place is foundational to First Peoples perspectives of the world.

Key questions about place:

- What is place?
- What are some ways in which people experience place?
- How can you gain a sense of place in your local environment?
- How can you share your observations and ideas about living things in your local environment to help someone else learn about place?

Content – Elaborations

- **classification:**
 - Is it living or non-living? Is it a plant, animal or something else?
 - differences between conventional scientific and indigenous ways of classifying
- **names:** e.g., common, indigenous and scientific
- **structural features:** How do stems, roots, leaves, skeleton or no skeleton or exoskeleton, lots of legs, few legs, eyes, etc. help us understand organisms?
- **behavioural adaptations:** dormancy, hibernation, nesting, migration, catching food, camouflage (stick bugs), mimicry (fly that looks like bee), territorialism (squirrels fighting), etc.
- **specific properties:**
 - solids keep shape; liquids and gases flow
 - properties of local materials determine use by First Peoples (local examples: cedar for canoes, mountain goat horns used as spoons, etc.)
- **sources of light:** natural sources include the sun; artificial sources include light bulbs
- **sound:** natural sources include crickets; artificial sources include car horns
- **properties of light:**
 - examples: brightness, colour
 - objects are made visible by radiating their own light or being illuminated by reflected light
 - interactions of light with different objects create images and shadows

Content – Elaborations

- light interactions can make plants grow, make shadows, or cause sunburn, depending on the source and location (seasons depend on light from the sun and how spread out the sun's rays are)
- plants grow toward light
- **sound:**
 - examples: pitch, tone, volume
 - ways of making, recording, and transmitting sound, etc.
- **common objects in the sky:**
 - the appearance of the moon and stars at night
 - sunrise/set, moonrise/set
 - the sun and the moon are important in different cultures, with respect to customs and traditions
- **local First Peoples:** e.g., may include oral history with Elder—origins and local stories
- **seasonal rounds:** Seasonal rounds refers to a pattern of movement from one resource-gathering area to another in a cycle that is followed each year
- **local patterns:** the relationship of local weather to the four seasons in terms of temperature, cloud cover, precipitation, and wind

BIG IDEAS

Living things have life cycles adapted to their environment.

Materials can be changed through physical and chemical processes.

Forces influence the motion of an object.

Water is essential to all living things, and it cycles through the environment.

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Questioning and predicting</p> <ul style="list-style-type: none"> • Demonstrate curiosity and a sense of wonder about the world • Observe objects and events in familiar contexts • Ask questions about familiar objects and events • Make simple predictions about familiar objects and events <p>Planning and conducting</p> <ul style="list-style-type: none"> • Make and record observations • Safely manipulate materials to test ideas and predictions • Make and record simple measurements using informal or non-standard methods <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • Recognize First Peoples stories (including oral and written narratives), songs, and art, as ways to share knowledge • Sort and classify data and information using drawings, pictographs and provided tables • Compare observations with predictions through discussion • Identify simple patterns and connections <p>Evaluating</p> <ul style="list-style-type: none"> • Compare observations with those of others • Consider some environmental consequences of their actions 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • metamorphic and non-metamorphic life cycles of different organisms • similarities and differences between offspring and parent • First Peoples use of their knowledge of life cycles • physical ways of changing materials • chemical ways of changing materials • types of forces • water sources including local watersheds • water conservation • the water cycle • local First People's knowledge of water: <ul style="list-style-type: none"> – water cycles – conservation – connection to other systems

Learning Standards (continued)

Curricular Competencies	Content
<p>Applying and innovating</p> <ul style="list-style-type: none"> Take part in caring for self, family, classroom and school through personal approaches Transfer and apply learning to new situations Generate and introduce new or refined ideas when problem solving <p>Communicating</p> <ul style="list-style-type: none"> Communicate observations and ideas using oral or written language, drawing, or role-play Express and reflect on personal experiences of place 	

Big Ideas – Elaborations	SCIENCE Grade 2
<p><i>Sample questions to support inquiry with students:</i></p> <p>Living things have life cycles adapted to their environment.</p> <ul style="list-style-type: none"> Why are life cycles important? How are the life cycles of local plants and animals similar and different? How do offspring compare to their parents? <p>Materials can be changed through physical and chemical processes.</p> <ul style="list-style-type: none"> Why would we want to change the physical properties of an object? What are some natural processes that involve chemical and physical changes? <p>Forces influence the motion of an object.</p> <ul style="list-style-type: none"> What are different ways that objects can be moved? How do different materials influence the motion of an object? <p>Water is essential to all living things, and it cycles through the environment.</p> <ul style="list-style-type: none"> Why is water important for all living things? How can you conserve water in your home and school? How does water cycle through the environment? 	

Curricular Competencies – Elaborations

- **Questioning and predicting:** Cycles are sequences or series of events that repeat/reoccur over time. A subset of pattern, cycles are looping or circular (cyclical) in nature. Cycles help people make predictions and hypotheses about the cyclical nature of the observable patterns.

Key questions about cycles:

- How do First Peoples use their knowledge of life cycles to ensure sustainability in their local environments?
- How does the water cycle impact weather?

- **place:** Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity. The connection between people and place is foundational to First Peoples perspectives of the world.

Key questions about place:

- What is place?
- What are some ways in which people experience place?
- How can you gain a sense of place in your local environment?
- How can you share your observations and ideas about living things in your local environment to help someone else learn about place?

Content – Elaborations

- **metamorphic:** metamorphic life cycles: body structure changes (e.g., caterpillar to butterfly, mealworm transformation, tadpoles to frog)
- **non-metamorphic:** non-metamorphic life cycles: organism keeps same body structure through life but size changes (e.g., humans)
- **offspring and parent:** a kitten looks like cat and a puppy looks like dog but they do change as they grow; salmon change a great deal as they grow and need fresh and salt water environments to survive
- **First Peoples use of their knowledge:**
 - stewardship: sustainably gathering plants and hunting/fishing in response to seasons and animal migration patterns (e.g., clam gardens, seasonal rounds, etc.)
 - sustainable fish hatchery programs run by local First Peoples
- **physical:** physical ways of changing materials:
 - warming, cooling, cutting, bending, stirring, mixing
 - materials may be combined or physically changed to be used in different ways (e.g., plants can be ground up and combined with other materials to make dyes)
- **chemical:** chemical ways of changing materials: cooking, burning, etc.
- **forces:**
 - contact forces and at-a-distance forces:
 - different types of magnets
 - static electricity

Content – Elaborations

- balanced and unbalanced forces:
 - the way different objects fall depending on their shape (air resistance)
 - the way objects move over/in different materials (water, air, ice, snow)
 - the motion caused by different strengths of forces
- **water sources:**
 - oceans, lakes, rivers, wells, springs
 - the majority of fresh water is stored underground and in glaciers
- **water conservation:** fresh water is a limited resource and is not being replaced at the same rate as it is being used
- **water cycle:** The water cycle is driven by the sun and includes evaporation, condensation, precipitation, and runoff. The water cycle is also a major component of weather (e.g., precipitation, clouds)
- **connection to other systems:** cultural significance of water (i.e., water is essential for all interconnected forms of life)

BIG IDEAS

Living things are diverse, can be grouped, and interact in their ecosystems.

All matter is made of particles.

Thermal energy can be produced and transferred.

Wind, water, and ice change the shape of the land.

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Questioning and predicting</p> <ul style="list-style-type: none"> • Demonstrate curiosity and a sense of wonder about the world • Observe objects and events in familiar contexts • Identify questions about familiar objects and events that can be investigated scientifically • Make predictions based on prior knowledge <p>Planning and conducting</p> <ul style="list-style-type: none"> • Suggest ways to plan and conduct an inquiry to find answers to their questions • Consider ethical responsibilities when deciding how to conduct an experiment • Safely use appropriate tools to make observations and measurements, using formal measurements and digital technology as appropriate • Make observations about living and non-living things in the local environment • Collect simple data <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • Identify First Peoples perspectives and knowledge as sources of information • Sort and classify data and information using drawings or provided tables • Use tables, simple bar graphs, or other formats to represent data and show simple patterns and trends • Compare results with predictions, suggesting possible reasons for findings 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • biodiversity in the local environment • the knowledge of local First Peoples of ecosystems • energy is needed for life • matter is anything that has mass and takes up space • atoms are building blocks of matter • sources of thermal energy • transfer of thermal energy • major local landforms • local First Peoples knowledge of local landforms • observable changes in the local environment caused by erosion and deposition by wind, water, and ice

Learning Standards (continued)

Curricular Competencies	Content
<p>Evaluating</p> <ul style="list-style-type: none"> • Make simple inferences based on their results and prior knowledge • Reflect on whether an investigation was a fair test • Demonstrate an understanding and appreciation of evidence • Identify some simple environmental implications of their and others' actions <p>Applying and innovating</p> <ul style="list-style-type: none"> • Contribute to care for self, others, school, and neighbourhood through personal or collaborative approaches • Co-operatively design projects • Transfer and apply learning to new situations • Generate and introduce new or refined ideas when problem solving <p>Communicating</p> <ul style="list-style-type: none"> • Represent and communicate ideas and findings in a variety of ways, such as diagrams and simple reports, using digital technologies as appropriate • Express and reflect on personal or shared experiences of place 	

Big Ideas – Elaborations	SCIENCE Grade 3
<p><i>Sample questions to support inquiry with students:</i></p> <p>Living things are diverse, can be grouped, and interact in their ecosystems.</p> <ul style="list-style-type: none"> • What is biodiversity? • Why is biodiversity important in an ecosystem? • Interconnectedness means that all things are related to and interact with each other in the environment. How does local First Peoples knowledge of living things demonstrate interconnectedness? <p>All matter is made of particles.</p> <ul style="list-style-type: none"> • Why is matter known as the material of the universe? • How are matter and energy related? 	

Big Ideas – Elaborations

Thermal energy can be produced and transferred.

- What can be a source of thermal energy?
- How is thermal energy transferred between objects?

Wind, water, and ice change the shape of the land.

- How is the shape of the land changed by environmental factors?
- What are landforms?
- What landforms do you have in your local area?

Curricular Competencies – Elaborations

- **Questioning and predicting:** Cause and effect is the basic principle that an action will result in a consequence. In science, this concept is closely related to the concepts of pattern and change. However, cause and effect may or may not have a predictable outcome.

Key questions about cause and effect:

- What are some causes of biodiversity in BC's wetlands?
- What is the effect of wind on mountains?

- **place:** Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity. The connection between people and place is foundational to First Peoples perspectives of the world.

Key questions about place:

- How does what you know about place affect your observations, questions, and predictions?
- How does understanding place help you analyze information and recognize connections and relationships in your local environment?
- How does place connect with stewardship?
- How can you be a steward in your local environment?

Content – Elaborations

- **biodiversity:**
 - biodiversity: the variety of different types of living things in an ecosystem
 - characteristics of local plants, animals and fungi
- **the knowledge of local First Peoples:** the interconnection between living and non-living things in the local environment; our shared responsibility to care for the local environment (i.e., stewardship); information shared from the local First Peoples community and Elders

Content – Elaborations

- **ecosystems:**
 - population: all the members of the same type of living thing (species) in an area
 - communities: different populations in an area living together
- **energy is needed for life:**
 - producers (plants), consumers (animals), and decomposers (bacteria and fungi) respond to their environment in energy pyramids (flow of energy in the community from the sun)
 - food chains: the flow of food energy from one organism to another (e.g., grass to rabbit to lynx)
 - food webs: interconnecting food chains (e.g., a rabbit may be eaten by a lynx or a wolf)
- **sources:** thermal energy can be produced by chemical reactions (e.g., hand warmers), friction between moving objects, the sun, etc.
- **thermal energy:** the energy that comes from the movement of particles within matter
- **transfer of thermal energy:**
 - conduction (touching — e.g., hold an ice cube)
 - convection (current — why do we hang mittens over a heat source?)
 - radiation (through space by a wave — e.g., heat from the sun)
- **landforms:** mountains, hills, plateaus, valleys, riverbeds, deltas, glaciers, etc.; oral narrative about landforms

BIG IDEAS

All living things sense and respond to their environment.

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

Energy can be transformed.

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

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Questioning and predicting</p> <ul style="list-style-type: none"> • Demonstrate curiosity about the natural world • Observe objects and events in familiar contexts • Identify questions about familiar objects and events that can be investigated scientifically • Make predictions based on prior knowledge <p>Planning and conducting</p> <ul style="list-style-type: none"> • Suggest ways to plan and conduct an inquiry to find answers to their questions • Consider ethical responsibilities when deciding how to conduct an experiment • Safely use appropriate tools to make observations and measurements, using formal measurements and digital technology as appropriate • Make observations about living and non-living things in the local environment • Collect simple data <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • Identify First Peoples perspectives and knowledge as sources of information • Sort and classify data and information using drawings or provided tables • Use tables, simple bar graphs, or other formats to represent data and show simple patterns and trends • Compare results with predictions, suggesting possible reasons for findings 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • sensing and responding: <ul style="list-style-type: none"> – humans – other animals – plants • biomes as large regions with similar environmental features • phases of matter • the effect of temperature on particle movement • energy: <ul style="list-style-type: none"> – has various forms – is conserved • devices that transform energy • local changes caused by Earth's axis, rotation, and orbit • the effects of the relative positions of the sun, moon, and Earth including local First Peoples perspectives

Learning Standards (continued)

Curricular Competencies	Content
<p>Evaluating</p> <ul style="list-style-type: none"> • Make simple inferences based on their results and prior knowledge • Reflect on whether an investigation was a fair test • Demonstrate an understanding and appreciation of evidence • Identify some simple environmental implications of their and others' actions <p>Applying and innovating</p> <ul style="list-style-type: none"> • Contribute to care for self, others, school, and neighbourhood through individual or collaborative approaches • Co-operatively design projects • Transfer and apply learning to new situations • Generate and introduce new or refined ideas when problem solving <p>Communicating</p> <ul style="list-style-type: none"> • Represent and communicate ideas and findings in a variety of ways, such as diagrams and simple reports, using digital technologies as appropriate • Express and reflect on personal or shared experiences of place 	

Big Ideas – Elaborations	SCIENCE Grade 4
<p><i>Sample questions to support inquiry with students:</i></p> <p>All living things sense and respond to their environment.</p> <ul style="list-style-type: none"> • How do living things sense, respond, and adapt to stimuli in their environment? • How is sensing and responding related to interdependence within ecosystems? <p>Matter has mass, takes up space, and can change phase.</p> <ul style="list-style-type: none"> • How can you explore the phases of matter? • How does matter change phases? • How does heating and cooling affect phase changes? 	

Big Ideas – Elaborations

Energy can be transformed.

- What is energy input and energy output?
- What is energy conservation?
- What is the relationship between energy input, output, and conservation?

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

- How do seasons and tides affect living and non-living things?
- What changes are caused by the movements of Earth and the moon?

Curricular Competencies – Elaborations

- **Questioning and predicting:** Order is a pattern that can be recognized as having levels—big to small, simple to complex—or as a process with a sequence of steps.

Key questions about order:

- How is order apparent in the adaptations of forest animals in BC?
- How does the order of seasons impact local plants and animals?

- **place:** Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity. The connection between people and place is foundational to First Peoples perspectives of the world.

Key questions about place:

- How does what you know about place affect your observations, questions, and predictions?
- How does understanding place help you analyze information and recognize connections and relationships in your local environment?
- How does place connect with stewardship?
- How can you be a steward in your local environment?

Content – Elaborations

- **humans:** e.g., the five senses
- **other animals:** e.g., echolocation, UV sensors, magnetoreception, infrared sensing, etc.
- **plants:** e.g., response to light, touch, water, gravity, etc.
- **biomes:** biomes are regions grouped by similar temperature and precipitation (e.g., climate: long-term weather patterns)
 - terrestrial biomes
 - aquatic/marine biomes

Content – Elaborations

- **effect of temperature:** solids, liquids, and gases change with heating (e.g., boiling point, melting point [melting chocolate]) and cooling (e.g., freezing point [making ice cream]), and these physical changes are reversible
- **various forms:** energy can be described in these ways: the energy of motion (kinetic), light, sound, thermal, elastic, nuclear, chemical, magnetic, , gravitational, and electrical
- **conserved:** the law of conservation of energy — energy cannot be created or destroyed but can be changed
- **devices that transform energy:** devices that transform energy change input energy into a different output energy (e.g., glow stick [chemical to light], wind-up toy [elastic to mechanical], flashlight [electrical to light])
- **Earth's axis, rotation, and orbit:** Earth's axis, rotation, and orbit cause changes locally:
 - day and night: animals are nocturnal (active at night) and diurnal (active during day)
 - annual seasons: plants and animals respond to the seasons (drop leaves, change colour)
- **the effects of the relative positions of the sun, moon, and Earth:**
 - phases of the moon, tides, etc.
 - tides affect living organisms
 - lunar and solar eclipses
- **local First Peoples perspectives:** teachings and stories about the sun and the moon

BIG IDEAS

Multicellular organisms have organ systems that enable them to survive and interact within their environment.

Solutions are homogeneous.

Machines are devices that transfer force and energy.

Earth materials change as they move through the rock cycle and can be used as natural resources.

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Questioning and predicting</p> <ul style="list-style-type: none"> • Demonstrate a sustained curiosity about a scientific topic or problem of personal interest • Make observations in familiar or unfamiliar contexts • Identify questions to answer or problems to solve through scientific inquiry • Make predictions about the findings of their inquiry <p>Planning and conducting</p> <ul style="list-style-type: none"> • With support, plan appropriate investigations to answer their questions or solve problems they have identified • Decide which variable should be changed and measured for a fair test • Choose appropriate data to collect to answer their questions • Observe, measure, and record data, using appropriate tools, including digital technologies • Use equipment and materials safely, identifying potential risks <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • Identify First Peoples perspectives and knowledge as sources of information • Construct and use a variety of methods, including tables, graphs, and digital technologies, as appropriate, to represent patterns or relationships in data • Identify patterns and connections in data • Compare data with predictions and develop explanations for results • Demonstrate an openness to new ideas and consideration of alternatives 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • basic structures and functions of body systems: <ul style="list-style-type: none"> – digestive – musculo-skeletal – respiratory – circulatory • solutions and solubility • properties of simple machines and their force effects • machines: <ul style="list-style-type: none"> – constructed – found in nature • power – the rate at which energy is transferred • the rock cycle • local types of earth materials • First Peoples concepts of interconnectedness in the environment • the nature of sustainable practices around BC's resources • First Peoples knowledge of sustainable practices

Learning Standards (continued)

Curricular Competencies	Content
<p>Evaluating</p> <ul style="list-style-type: none"> • Evaluate whether their investigations were fair tests • Identify possible sources of error • Suggest improvements to their investigation methods • Identify some of the assumptions in secondary sources • Demonstrate an understanding and appreciation of evidence • Identify some of the social, ethical, and environmental implications of the findings from their own and others' investigations <p>Applying and innovating</p> <ul style="list-style-type: none"> • Contribute to care for self, others, and community through personal or collaborative approaches • Co-operatively design projects • Transfer and apply learning to new situations • Generate and introduce new or refined ideas when problem solving <p>Communicating</p> <ul style="list-style-type: none"> • Communicate ideas, explanations, and processes in a variety of ways • Express and reflect on personal, shared, or others' experiences of place 	

Big Ideas – Elaborations

Sample questions to support inquiry with students:

Multicellular organisms have organ systems that enable them to survive and interact within their environment.

- How do organ systems interact with one another?
- How do organ systems interact with their environment to meet basic needs?

Solutions are homogeneous.

- How are solutions homogeneous?
- What are their uses?

Machines are devices that transfer force and energy.

- How do machines (natural and human-made) transfer force and energy?
- What natural machines can you identify in your local environment?

Earth materials change as they move through the rock cycle and can be used as natural resources.

- How do we interact with water, rocks, minerals, soils, and plants?
- How can Earth be considered a closed material system?
- How can we act as stewards of our environment?

Curricular Competencies – Elaborations

- **Questioning and predicting:** A system is a set of interacting or interdependent pieces or components that come together to form a whole. A system occupies a physical or a temporal space within a set environment, has a representative form, and possesses a purpose or function.

Key questions about systems:

- How do the systems of the human body work together?
- How can you observe the concept of interconnectedness within ecosystems in your local area?

- **secondary sources:** secondary sources of evidence could include anthropological and contemporary accounts of First Peoples of BC, news media, archives, journals, etc.

- **place:** Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity. The connection between people and place is foundational to First Peoples perspectives of the world.

Key questions about place:

- How does place influence your ability to plan and conduct an inquiry?
- How does your understanding of place affect the ways in which you collect evidence and evaluate it?
- How do the place-based experiences and stories of others affect the ways in which you communicate your findings and other information?
- Ways of knowing refers to the various beliefs about the nature of knowledge that people have; they can include, but are not limited to, Aboriginal, gender-related, subject/discipline specific, cultural, embodied and intuitive beliefs about knowledge. What are the connections between ways of knowing and place?

Content – Elaborations

- **digestive:** mouth, stomach, intestines, etc.
- **musculo-skeletal:** muscles and skeleton
- **respiratory:** trachea, lungs and diaphragm
- **circulatory:** heart, blood, blood vessels
- **solutions and solubility:**
 - solutions (e.g., apple juice, coffee) that can be separated through distillation, evaporation, and crystallization
 - solubility of solids, liquids, and gases (e.g., salt [solid], honey [liquid], carbon dioxide [gas in water makes pop])
 - properties of solutions: concentration, pH, etc.
 - dissolving: process of forming a solution
- **simple machines:** levers, wedge, inclined plane, wheel and axle, pulley, and screw
- **force effects:** force effects include changing direction and multiplying force
- **constructed:** combinations of simple machines form complex machines
- **found in nature:** the lever is the basis of nearly every aspect of the musculoskeletal system
- **power:** examples include students racing up a hill, machine power ratings, motors
- **earth materials:** include mineral, rock, clay, boulder, gravel, sand, soil
- **interconnectedness:** everything in the environment is one/connected (e.g., sun, sky, plants and animals) and we have a responsibility to care for them

BIG IDEAS

Multicellular organisms rely on internal systems to survive, reproduce, and interact with their environment.

Everyday materials are often mixtures.

Newton's three laws of motion describe the relationship between force and motion.

The solar system is part of the Milky Way, which is one of billions of galaxies.

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Questioning and predicting</p> <ul style="list-style-type: none"> • Demonstrate a sustained curiosity about a scientific topic or problem of personal interest • Make observations in familiar or unfamiliar contexts • Identify questions to answer or problems to solve through scientific inquiry • Make predictions about the findings of their inquiry <p>Planning and conducting</p> <ul style="list-style-type: none"> • With support, plan appropriate investigations to answer their questions or solve problems they have identified • Decide which variable should be changed and measured for a fair test • Choose appropriate data to collect to answer their questions • Observe, measure, and record data, using appropriate tools, including digital technologies • Use equipment and materials safely, identifying potential risks <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • Identify First Peoples perspectives and knowledge as sources of information • Construct and use a variety of methods, including tables, graphs, and digital technologies, as appropriate, to represent patterns or relationships in data • Identify patterns and connections in data • Compare data with predictions and develop explanations for results • Demonstrate an openness to new ideas and consideration of alternatives 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • the basic structures and functions of body systems: <ul style="list-style-type: none"> – excretory – reproductive – hormonal – nervous • heterogeneous mixtures • mixtures: <ul style="list-style-type: none"> – separated using a difference in component properties – local First Peoples knowledge of separation and extraction methods • Newton's three laws of motion • effects of balanced and unbalanced forces in daily physical activities • force of gravity • the overall scale, structure, and age of the universe • the position, motion, and components of our solar system in our galaxy

Learning Standards (continued)

Curricular Competencies	Content
<p>Evaluating</p> <ul style="list-style-type: none"> Evaluate whether their investigations were fair tests Identify possible sources of error Suggest improvements to their investigation methods Identify some of the assumptions in secondary sources Demonstrate an understanding and appreciation of evidence Identify some of the social, ethical, and environmental implications of the findings from their own and others' investigations <p>Applying and innovating</p> <ul style="list-style-type: none"> Contribute to care for self, others, and community through personal or collaborative approaches Co-operatively design projects Transfer and apply learning to new situations Generate and introduce new or refined ideas when problem solving <p>Communicating</p> <ul style="list-style-type: none"> Communicate ideas, explanations, and processes in a variety of ways Express and reflect on personal, shared, or others' experiences of place 	

Big Ideas – Elaborations	SCIENCE Grade 6
<p><i>Sample questions to support inquiry with students:</i></p> <p>Multicellular organisms rely on internal systems to survive, reproduce, and interact with their environment.</p> <ul style="list-style-type: none"> How are internal systems necessary for survival? What do your body systems require for survival? How do your body systems interact with one another? <p>Everyday materials are often mixtures.</p> <ul style="list-style-type: none"> What is a heterogeneous mixture? 	

Big Ideas – Elaborations

- How can mixtures be separated?

Newton's three laws of motion describe the relationship between force and motion.

- What is the difference between motion caused by balanced forces and motion caused by unbalanced forces?
- How are balanced and unbalanced forces evident in your life and activities?

The solar system is part of the Milky Way, which is one of billions of galaxies.

- What are the relationships between Earth and the rest of the universe?
- What is an extreme environment?
- What extreme environments exist on Earth or in our galaxy?

Curricular Competencies – Elaborations

- **Questioning and predicting:** Change is making the form, nature, content or future course of something different from what it is or what it would be if left alone. For example, Newton's third law, the idea that for every action there is an equal and opposite reaction describes the changes that occur in response to pushes and pulls.

Key questions about change:

- How has our solar system changed over time?
- How has the exploration of extreme environments on Earth and in space changed in the last decade?

- **secondary sources:** secondary sources of evidence could include anthropological and contemporary accounts of First Peoples of BC, news media, archives, journals, etc.

- **place:** Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity. The connection between people and place is foundational to First Peoples perspectives of the world.

Key questions about place:

- How does place influence your ability to plan and conduct an inquiry?
- How does your understanding of place affect the ways in which you collect evidence and evaluate it?
- How do the place-based experiences and stories of others affect the ways in which you communicate your findings and other information?
- Ways of knowing refers to the various beliefs about the nature of knowledge that people have; they can include, but are not limited to, Aboriginal, gender-related, subject/discipline specific, cultural, embodied and intuitive beliefs about knowledge. What are the connections between ways of knowing and place?

Content – Elaborations

- **systems:** First People's understandings of body systems in humans and animals
- **excretory:** kidneys, ureters, bladder, etc.
- **reproductive:** ovaries, testes, etc.
- **hormonal:** chemical messengers in the body (e.g., insulin, adrenalin)
- **nervous:** brain, spinal cord, etc.; role of receptors — the brain interprets the signals received and can make mistakes (e.g., optical illusions) in those interpretations
- **heterogeneous mixtures:** suspensions (e.g., salad dressing), emulsions (e.g., milk), colloids (e.g., aerosols)
- **separated using a difference in component properties:**
 - density (e.g., centrifuge or settling, silt deposits in a river delta, tailings ponds, Roman aqueduct settling sections)
 - particle size (e.g., sieves, filters)
- **local First Peoples knowledge:** historical and current First Peoples use of separation and extraction methods (e.g., eulachon oil, extraction of medicines from plants, pigments, etc.)
- **Newton's three laws of motion:**
 - first law: objects will stay stopped or in constant motion until acted upon by an outside force
 - second law: only an unbalanced force causes acceleration
 - third law: every force has an equal and opposite reaction force
- **balanced and unbalanced forces:**
 - balanced forces are equal and opposite forces (e.g., sitting in a chair)
 - unbalanced forces are unequal; one force is larger (e.g., race cars on different ramps, mousetrap cars, rockets)
- **daily physical activities:** examples of effects of balanced and unbalanced forces in school sports and physical education activities
- **force of gravity:**
 - gravity is the force of attraction between objects that pulls all objects toward each other
 - on Earth, gravity pulls objects toward the centre of the planet (e.g., falling objects, egg drop)
- **components of our solar system:**
 - planets, moons, asteroids, meteors, comets, etc.
 - First Peoples perspectives regarding aurora borealis and other celestial phenomena
 - extreme environments including contributions of Canadians to exploration technologies (e.g., Canadarm, Newt Suit, VENUS and NEPTUNE programs)

BIG IDEAS

Evolution by natural selection provides an explanation for the diversity and survival of living things.

Elements consist of one type of atom, and compounds consist of atoms of different elements chemically combined.

The electromagnetic force produces both electricity and magnetism.

Earth and its climate have changed over geological time.

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Questioning and predicting</p> <ul style="list-style-type: none"> • Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal interest • Make observations aimed at identifying their own questions about the natural world • Identify a question to answer or a problem to solve through scientific inquiry • Formulate alternative “If...then...” hypotheses based on their questions • Make predictions about the findings of their inquiry <p>Planning and conducting</p> <ul style="list-style-type: none"> • Collaboratively plan a range of investigation types, including field work and experiments, to answer their questions or solve problems they have identified • Measure and control variables (dependent and independent) through fair tests • Observe, measure, and record data (qualitative and quantitative), using equipment, including digital technologies, with accuracy and precision • Use appropriate SI units and perform simple unit conversions • Ensure that safety and ethical guidelines are followed in their investigations <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information • Construct and use a range of methods to represent patterns or relationships in data, including tables, graphs, keys, models, and digital technologies as appropriate • Seek patterns and connections in data from their own investigations and secondary sources • Use scientific understandings to identify relationships and draw conclusions 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • organisms have evolved over time • survival needs • natural selection • elements and compounds are pure substances • crystalline structure of solids • chemical changes • electricity <ul style="list-style-type: none"> – generated in different ways with different environmental impacts – electromagnetism • the fossil record provides evidence for changes in biodiversity over geological time • First Peoples knowledge of changes in biodiversity over time • evidence of climate change over geological time and the recent impacts of humans: <ul style="list-style-type: none"> – physical records – local First Peoples knowledge of climate change

Learning Standards (continued)

Curricular Competencies	Content
<p>Evaluating</p> <ul style="list-style-type: none"> • Reflect on their investigation methods, including the adequacy of controls on variables (dependent and independent) and the quality of the data collected • Identify possible sources of error and suggest improvements to their investigation methods • Demonstrate an awareness of assumptions and bias in their own work and secondary sources • Demonstrate an understanding and appreciation of evidence (qualitative and quantitative) • Exercise a healthy, informed skepticism and use scientific knowledge and findings from their own investigations to evaluate claims in secondary sources • Consider social, ethical, and environmental implications of the findings from their own and others' investigations <p>Applying and innovating</p> <ul style="list-style-type: none"> • Contribute to care for self, others, community, and world through personal or collaborative approaches • Co-operatively design projects • Transfer and apply learning to new situations • Generate and introduce new or refined ideas when problem solving <p>Communicating</p> <ul style="list-style-type: none"> • Communicate ideas, findings, and solutions to problems, using scientific language, representations, and digital technologies as appropriate • Express and reflect on a variety of experiences and perspectives of place 	

Big Ideas – Elaborations	SCIENCE Grade 7
<p><i>Sample questions to support inquiry with students:</i></p> <p>Evolution by natural selection provides an explanation for the diversity and survival of living things.</p> <ul style="list-style-type: none"> • Why do living things change over time? • How do these changes affect biodiversity? 	

Big Ideas – Elaborations

Elements consist of one type of atom, and compounds consist of atoms of different elements chemically combined.

- What are the similarities and differences between elements and compounds?
- How can you investigate the properties of elements and compounds?

The electromagnetic force produces both electricity and magnetism.

- How is electricity generated?
- What is the relationship between electricity and magnetism?

Earth and its climate have changed over geological time.

- How and why have Earth and its climate changed over time?
- How do people and their practices impact Earth and its climate?

Curricular Competencies – Elaborations

- **Questioning and predicting:** Evolution is the change that occurs in living things over long periods of time. This change is a result of organisms being suited to their environment. Evolution is an important concept in biological science, as scientists are always searching for the underlying laws, reasons, or explanations for their observations of living things.

Key questions about evolution:

- How have species on Earth evolved due to natural selection?
- How does fossil evidence support the evolution of geological time?

- **qualitative:** evidence expressed through words, descriptions, interviews, narratives
- **quantitative:** evidence expressed through numbers and measurement
- **accuracy:** how close a measured value is to the actual value
- **precision:** how close measurements of the same type are to each other
- **ways of knowing:** Ways of knowing refers to the various beliefs about the nature of knowledge that people have; they can include, but are not limited to, Aboriginal, gender-related, subject/discipline specific, cultural, embodied and intuitive beliefs about knowledge.
- **place:** Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity. The connection between people and place is foundational to First Peoples perspectives of the world.

Key questions about place:

- How does place inform your questions and inquiries?
- How does place influence your ability to plan and conduct an inquiry and make predictions about outcomes?
- How does your understanding of place affect the ways in which you collect evidence and evaluate it?
- As you consider the significance, worth, or value of an outcome or finding, how can you show different ways of knowing?
- How can your understanding of place influence project designs?
- How do the place-based experiences and stories of others affect the ways in which you communicate and collaborate?

Content – Elaborations

- **organisms have evolved over time:** change in traits of populations over time
- **survival needs:** all organisms need space, food, water, and access to resources in order to survive
- **natural selection:** the natural process by which certain traits that have a greater fitness for their environment lead to a reproductive advantage; this process happens within a population over time because of genetic variation
- **elements:** a pure substance consisting of a single type of atom, as distinguished by its atomic number (e.g., iron, copper)
- **compounds:** a pure substance consisting of two or more different atoms held together in a defined special arrangement by chemical bonds (e.g., water/salt)
- **pure substances:** matter that consists of only one type of particle and has one set of properties (e.g., density, boiling point, solubility, conductivity)
- **crystalline structure:** crystals formed by a unique arrangement of particles (e.g., rock candy, quartz, snowflakes)
- **chemical changes:** when atoms rearrange into new products accompanied by an energy change (e.g., rusting, the reaction of vinegar and baking soda, etc.)
- **generated in different ways:** ways of generating electricity including the use of wind, water, coal, geothermal, and solar energy
- **electromagnetism:**
 - the electromagnetic force is responsible for both electricity and magnetism
 - moving or changing a magnetic field relative to a wire produces electric current (e.g., electricity generation by a turbine)
 - an electric current passing through a wire produces a magnetic field (e.g., constructing a simple electromagnet using a wire, iron nail and battery)
- **geological time:**
 - the geologic time scale categorizes the time periods of Earth's geologic history
 - ages of rocks and fossils can be determined by both relative and absolute methods
- **climate change:** change in climate affects:
 - the interconnectedness of plants and animals, and their local environment
 - e.g., changes to harvesting dates, changes to schedules due to early/late ripening and runs, lowered water levels in creeks, rivers and lakes, change in humidity impacts the ability to preserve salmon, etc.
- **impacts of humans:**
 - humans are capable of changing Earth's landscape, climate, and systems
 - efficacy of sustainable practices
- **Physical records:** ice flow data, fossil record, etc.
- **local First Peoples knowledge of climate change:** oral history, change in traditional practice (e.g., the timing of harvest has been impacted by climate change), etc.

BIG IDEAS

Life processes are performed at the cellular level.

The behaviour of matter can be explained by the kinetic molecular theory and atomic theory.

Energy can be transferred as both a particle and a wave.

The theory of plate tectonics is the unifying theory that explains Earth's geological processes.

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Questioning and predicting</p> <ul style="list-style-type: none"> • Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal interest • Make observations aimed at identifying their own questions about the natural world • Identify a question to answer or a problem to solve through scientific inquiry • Formulate alternative “If...then...” hypotheses based on their questions • Make predictions about the findings of their inquiry <p>Planning and conducting</p> <ul style="list-style-type: none"> • Collaboratively plan a range of investigation types, including field work and experiments, to answer their questions or solve problems they have identified • Measure and control variables (dependent and independent) through fair tests • Observe, measure, and record data (qualitative and quantitative), using equipment, including digital technologies, with accuracy and precision • Use appropriate SI units and perform simple unit conversions • Ensure that safety and ethical guidelines are followed in their investigations <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information • Construct and use a range of methods to represent patterns or relationships in data, including tables, graphs, keys, models, and digital technologies as appropriate • Seek patterns and connections in data from their own investigations and secondary sources • Use scientific understandings to identify relationships and draw conclusions 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • characteristics of life • cell theory and types of cells • photosynthesis and cellular respiration • the relationship of micro-organisms with living things: <ul style="list-style-type: none"> – basic functions of the immune system – vaccination and antibiotics – impacts of epidemics and pandemics on human populations • kinetic molecular theory (KMT) • atomic theory and models • protons, neutrons, and quarks • electrons and leptons • types and effects of electromagnetic radiation • light: <ul style="list-style-type: none"> – properties – behaviours – ways of sensing • plate tectonic movement • major geological events of local significance • First Peoples knowledge of: <ul style="list-style-type: none"> – local geological formations – significant local geological events • layers of Earth

Learning Standards (continued)

Curricular Competencies	Content
<p>Evaluating</p> <ul style="list-style-type: none"> • Reflect on their investigation methods, including the adequacy of controls on variables (dependent and independent) and the quality of the data collected • Identify possible sources of error and suggest improvements to their investigation methods • Demonstrate an awareness of assumptions and bias in their own work and secondary sources • Demonstrate an understanding and appreciation of evidence (qualitative and quantitative) • Exercise a healthy, informed skepticism and use scientific knowledge and findings from their own investigations to evaluate claims in secondary sources • Consider social, ethical, and environmental implications of the findings from their own and others' investigations <p>Applying and innovating</p> <ul style="list-style-type: none"> • Contribute to care for self, others, community, and world through personal or collaborative approaches • Co-operatively design projects • Transfer and apply learning to new situations • Generate and introduce new or refined ideas when problem solving <p>Communicating</p> <ul style="list-style-type: none"> • Communicate ideas, findings, and solutions to problems, using scientific language, representations, and digital technologies as appropriate • Express and reflect on a variety of experiences and perspectives of place 	

Big Ideas – Elaborations	SCIENCE Grade 8
<p><i>Sample questions to support inquiry with students:</i></p> <p>Life processes are performed at the cellular level.</p> <ul style="list-style-type: none"> • How can you tell if something is living? • How do humans and micro-organisms interact? <p>The behaviour of matter can be explained by the kinetic molecular theory and atomic theory.</p> <ul style="list-style-type: none"> • What are some practical applications of the kinetic molecular theory? • What is the relationship between the atomic theory and kinetic molecular theory? 	

Big Ideas – Elaborations

Energy can be transferred as both a particle and a wave.

- How does electromagnetic energy behave like both a particle and a wave?
- What are the properties and behaviours of light?
- How do you sense light?

The theory of plate tectonics is the unifying theory that explains Earth's geological processes.

- How does the movement of Earth's tectonic plates cause observable changes and effects?
- How does tectonic plate movement affect you locally?
- What evidence of plate tectonic movement is shared by First Peoples?

Curricular Competencies – Elaborations

- **Questioning and predicting:** Matter is anything that has mass and takes up space. Energy is the ability to cause change or do work. The universe is made up of matter and energy.

Key questions about matter and energy:

- What is the relationship between matter and energy and the cell theory?
- How do matter and energy connect to the kinetic molecular theory?

- **qualitative:** evidence expressed through words, descriptions, interviews, narratives
- **quantitative:** evidence expressed through numbers and measurement
- **accuracy:** how close a measured value is to the actual value
- **precision:** how close measurements of the same type are to each other
- **ways of knowing:** Ways of knowing refers to the various beliefs about the nature of knowledge that people have; they can include, but are not limited to, Aboriginal, gender-related, subject/discipline specific, cultural, embodied and intuitive beliefs about knowledge.
- **place:** Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity. The connection between people and place is foundational to First Peoples perspectives of the world.

Key questions about place:

- How does place inform your questions and inquiries?
- How does place influence your ability to plan and conduct an inquiry and make predictions about outcomes?
- How does your understanding of place affect the ways in which you collect evidence and evaluate it?
- As you consider the significance, worth, or value of an outcome or finding, how can you show different **ways of knowing**?
- How can your understanding of place influence project designs?
- How do the place-based experiences and stories of others affect the ways in which you communicate and collaborate?

Content – Elaborations

- **characteristics of life:** living things respire, grow, take in nutrients, produce waste, respond to stimuli, and reproduce; there is debate as to whether or not to classify viruses as living things
- **cell theory:**
 - living things are made of one or more cells
 - all cells come from pre-existing cells
 - the cell is a basic unit of life
- **types of cells:**
 - prokaryotic and eukaryotic cells
 - plant and animal cells
 - cells contain structures that carry out essential functions
- **micro-organisms:**
 - micro-organisms are key to nutrient recycling in ecosystems as they act as decomposers
 - viruses and bacteria can cause disease and can also be used in industry (e.g., production of cheese and salami) and agriculture (e.g., production of striped tulips)
- **immune system:**
 - the immune system provides a barrier to infections and a number of non-specific and specific responses to fight infection (e.g., fever, antibodies, phagocytes, inflammation)
 - different populations have greater immunity to certain infections than other populations (e.g., impact of smallpox epidemic on First Peoples)
- **vaccination:** vaccination can prevent the spread of infectious disease
- **antibiotics:** antibiotics are effective only against living organisms, such as bacteria, and not against viruses; overuse of antibiotics can lead to the development of antibiotic-resistant strains of bacteria (“superbugs”)
- **epidemics:** regional outbreaks (e.g., smallpox, measles)
- **pandemics:** global outbreaks (e.g., Spanish flu, SARS)
- **kinetic molecular theory (KMT):** explains how particles move in different states
- **atomic theory:** provides evidence for the existence of atoms and molecules
- **models:** models can be used to represent:
 - the arrangement and motion of particles in different phases
 - the arrangement of and forces that bind protons, neutrons, and electrons in an atom
 - the quarks and leptons in protons, neutrons, and electrons
- **protons, neutrons, and quarks:** protons and neutrons (made of quarks) are held together in the nucleus by a strong nuclear force
- **electrons and leptons:** electrons (a type of lepton) are held at a distance from the nucleus through electromagnetism
- **types:** types of electromagnetic radiation: the electromagnetic spectrum consists of radio, microwave, infrared, light, UV, X-ray, and gamma rays
- **effects:** effects of electromagnetic radiation: positive effects include cancer treatments; negative effects include sunburns

Content – Elaborations

- **properties:** properties of light
 - acts like both a wave and a particle
 - wavelength, amplitude, frequency
- **behaviours:** behaviours of light:
 - reflection, refraction, absorption, transmission, scattering
 - images formed by lenses and mirrors
 - effects of translucent, transparent, and opaque objects
- **ways of sensing:** ways of sensing light: human vision, optical instruments, cameras
- **plate tectonic movement:**
 - types of plate movements
 - plate boundaries
 - earthquakes and volcanoes

BIG IDEAS

Cells are derived from cells.

The electron arrangement of atoms impacts their chemical nature.

Electric current is the flow of electric charge.

The biosphere, geosphere, hydrosphere, and atmosphere are interconnected, as matter cycles and energy flows through them.

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Questioning and predicting</p> <ul style="list-style-type: none"> • Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal interest • Make observations aimed at identifying their own questions, including increasingly complex ones, about the natural world • Formulate multiple hypotheses and predict multiple outcomes <p>Planning and conducting</p> <ul style="list-style-type: none"> • Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative) • Assess risks and address ethical, cultural and/or environmental issues associated with their proposed methods and those of others • Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data • Ensure that safety and ethical guidelines are followed in their investigations <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information • Seek and analyze patterns, trends, and connections in data, including describing relationships between variables (dependent and independent) and identifying inconsistencies • Construct, analyze and interpret graphs (including interpolation and extrapolation), models and/or diagrams • Use knowledge of scientific concepts to draw conclusions that are consistent with evidence • Analyze cause-and-effect relationships 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • asexual reproduction: <ul style="list-style-type: none"> – mitosis – different forms • sexual reproduction: <ul style="list-style-type: none"> – meiosis – human sexual reproduction • element properties as organized in the periodic table • The arrangement of electrons determines the compounds formed by elements • circuits — must be complete for electrons to flow • voltage, current, and resistance • effects of solar radiation on the cycling of matter and energy • matter cycles within biotic and abiotic components of ecosystems • sustainability of systems • First Peoples knowledge of interconnectedness and sustainability

Learning Standards (continued)

Curricular Competencies	Content
<p>Evaluating</p> <ul style="list-style-type: none"> • Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions • Describe specific ways to improve their investigation methods and the quality of the data • Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled • Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and secondary sources • Consider the changes in knowledge over time as tools and technologies have developed • Connect scientific explorations to careers in science • Exercise a healthy, informed skepticism, and use scientific knowledge and findings to form their own investigations and to evaluate claims in secondary sources • Consider social, ethical, and environmental implications of the findings from their own and others' investigations • Critically analyze the validity of information in secondary sources and evaluate the approaches used to solve problems <p>Applying and innovating</p> <ul style="list-style-type: none"> • Contribute to care for self, others, community, and world through individual or collaborative approaches • Transfer and apply learning to new situations • Generate and introduce new or refined ideas when problem solving • Contribute to finding solutions to problems at a local and/or global level through inquiry • Consider the role of scientists in innovation <p>Communicating</p> <ul style="list-style-type: none"> • Formulate physical or mental theoretical models to describe a phenomenon • Communicate scientific ideas, claims, information, and perhaps a suggested course of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations • Express and reflect on a variety of experiences, perspectives, and worldviews through place 	

Big Ideas – Elaborations

Sample questions to support inquiry with students:

Cells are derived from cells.

- How do cells multiply?
- What are the advantages and disadvantages of sexual and asexual reproduction?

The electron arrangement of atoms impacts their chemical nature.

- Which patterns are shown on the periodic table?
- How can the periodic table be represented in a different form?

Electric current is the flow of electric charge.

- Why do electrons flow in a circuit?
- How does increasing current impact your personal safety with electricity?

The biosphere, geosphere, hydrosphere, and atmosphere are interconnected, as matter cycles and energy flows through them.

- How do Earth's major spheres interact?
- How do matter and energy move through ecosystems?
- How do First Peoples view the cycling of matter and energy?

Curricular Competencies – Elaborations

- **Questioning and predicting:** An interaction is a kind of action that occurs when two or more objects have an effect on one another. The interaction may be direct or indirect. In a direct interaction, A has a direct effect on B. An example of a direct interaction is wolves preying on elk. In an indirect interaction, A has an effect on B that affects C. For example, ladybugs have an indirect effect on plants because they eat aphids.

Key questions about interactions:

- How do the four spheres of the Earth interact?
- How can understanding the interactions of Earth's spheres help us prepare for natural disasters?

- **ways of knowing:** Ways of knowing refers to the various beliefs about the nature of knowledge that people have; they can include, but are not limited to, Aboriginal, gender-related, subject/discipline specific, cultural, embodied and intuitive beliefs about knowledge.

- **place:** Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity. The connection between people and place is foundational to First Peoples perspectives of the world.

Key questions about place:

- How does place inform your questions and inquiries?
- How does place influence your ability to plan and conduct an inquiry and make predictions about outcomes?
- How does your understanding of place affect the ways in which you collect evidence and evaluate it?
- How can you demonstrate ways of knowing that your work and the work of others is valid, free of bias, and acknowledges limitations?

Curricular Competencies – Elaborations

- How can your understanding of place influence project designs?
- How do the place-based experiences and stories of others affect the ways in which you communicate and collaborate?
- How can you demonstrate an understanding of place and interconnectedness by the ways in which you represent the results of your investigation?

Content – Elaborations

- **mitosis:** the process through which pre-existing cells make two identical copies of themselves
- **different forms:** different forms of asexual reproduction: fission, budding, cloning, spores, grafting
- **meiosis:** the process through which sex cells (eggs and sperm) are formed by the dividing of a parent cell twice, resulting in four daughter cells
- **human sexual reproduction:** the result of humans having two parents is that offspring are not genetically identical to either parent
- **periodic table:** The periodic table groups elements according to their atomic number and properties (e.g., atomic size, metals/non-metals/semi-metals, chemical families, diatomic elements).
- **compounds:**
 - ionic and covalent
 - names and formulas
- **circuits:**
 - basic components include power source, load/resistor (lightbulbs, etc.), conductor and switch
 - types of circuits include series, parallel, short circuits
 - current flow in a circuit: alternating current (AC) and direct current (DC)
- **voltage, current, and resistance:** voltage, current, and resistance are related:
 - Ohm's Law ($V=IR$)
 - relative dangers of current and voltage
- **effects of solar radiation:** solar radiation provides the energy required for most life on Earth, and is the root cause of wind and ocean currents, which distribute energy and nutrients around the planet, as well as the energy sources for the water cycle
- **matter cycles:**
 - e.g., water, nitrogen, carbon, phosphorous, etc.
 - human impacts on sources and sinks (e.g., climate change, deforestation, agriculture, etc.)
 - bioaccumulation and biomagnification
- **sustainability of systems:** a systems approach to sustainability sees all matter and energy as interconnected and existing in dynamic equilibrium (e.g., carbon as a key factor in climate change, greenhouse effect, water cycle, etc.)
- **interconnectedness:** everything is connected, from local to global; First Peoples perspectives on interconnectedness
- **sustainability:** First Peoples perspectives on sustainability of systems