

Science Kindergarten to Grade 6 Curriculum

	Kindergarten			Grade 1			Grade 2		
Organizing Idea	Matter: Understandings of the physical world are deepened by investigating matter and energy.								
Guiding Question	How can properties of an object be distinguished from one another?			How can properties of an object be altered?			How can the suitability of materials be determined for specific purposes?		
Learning Outcome	Children examine properties of objects.			Students analyze properties of objects and investigate how they can be changed.			Students investigate properties of materials and relate them to a purpose.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>An object is anything that can be perceived using one or more of the five senses.</p> <p>The five senses are</p> <ul style="list-style-type: none"> • sight • touch • hearing • smell • taste <p>Properties are distinctive characteristics.</p> <p>Properties of objects that can be perceived using one or more of the five senses include</p> <ul style="list-style-type: none"> • colour; e.g., blue, yellow • size; e.g., long, short • shape; e.g., round, square • texture; e.g., rough, smooth • temperature; e.g., hot, cold • sound; e.g., loud, quiet • scent; e.g., fresh, rotten • taste; e.g., sweet, sour 	<p>Objects have identifiable properties.</p> <p>Objects may be similar in one or more properties and different in another property.</p>	<p>Explore properties of various objects using one or more of the five senses.</p> <p>Describe properties of various objects.</p> <p>Sort various objects according to properties.</p> <p>Compare properties of various objects.</p>	<p>Measurable properties of objects include</p> <ul style="list-style-type: none"> • length • how much flat space an object covers (area) • weight (mass) <p>Weight is the heaviness of an object.</p> <p>Tools, such as balance scales and magnifying glasses, can be used to examine properties of objects and materials.</p>	<p>Objects have measurable properties.</p>	<p>Identify measurable properties of objects.</p> <p>Directly compare the length, area, and weight of various objects.</p> <p>Use various tools safely when examining the properties of objects.</p>	<p>Materials are used to make objects.</p>	<p>Materials can be combined in a variety of ways to make objects.</p>	<p>Identify the materials used to make various objects.</p> <p>Combine materials to create an object for a specific purpose.</p>

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				<p>Properties that can be changed include</p> <ul style="list-style-type: none"> length area weight (mass) shape texture <p>Actions that physically change properties of an object include</p> <ul style="list-style-type: none"> bending twisting stretching cutting breaking <p>Not all objects respond the same way to bending, twisting, stretching, cutting, or breaking.</p>	<p>Physical changes to objects do not change what the objects are made of.</p>	<p>Predict how actions can physically change properties of various objects.</p> <p>Explore actions that physically change properties of various objects.</p> <p>Describe physical changes that result from various actions.</p> <p>Discuss why physical changes do not change what an object is made of.</p>	<p>Properties of materials that can be tested include</p> <ul style="list-style-type: none"> if light passes through (transparency) if water is absorbed if the material can be shaped (malleability) if light is reflected (reflection) <p>Various properties of materials can be measured, including length and weight (mass).</p>	<p>Materials have unique properties.</p>	<p>Test properties of various materials.</p> <p>Measure various materials using non-standard measurements.</p>
							<p>Natural materials are those that come from plants, animals, the land, or the sky.</p> <p>Processed materials are made by humans.</p>	<p>Materials are natural or processed.</p> <p>All processed materials originate from natural materials.</p>	<p>Sort various materials as being natural or processed.</p>
							<p>An object can be made from different materials; e.g., a canoe can be made from wood or aluminium.</p> <p>Examples of objects made from natural materials that are created and used by First Nations, Métis, and Inuit are</p> <ul style="list-style-type: none"> Dene birchbark baskets travois Red River carts canoes Inuit scraping tools; e.g., ulu 	<p>Natural and processed materials are used to make objects that serve a variety of purposes.</p>	<p>Identify natural and processed materials that could be used for a specific purpose.</p> <p>Identify an object that can be made from different materials.</p> <p>Identify natural materials used by local First Nations, Métis, or Inuit and relate the materials' uses to specific purposes.</p>

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							<p>Knowledge of the properties of materials and their purposes is important in many occupations and roles, such as</p> <ul style="list-style-type: none"> • carpenter • engineer • designer • Knowledge Keeper or Elder <p>First Nations, Métis, and Inuit use of materials is informed by</p> <ul style="list-style-type: none"> • traditional knowledge • time of year • availability • taking only what is needed • respect for the land 	<p>The purpose of an object influences the choice of materials used to produce it.</p> <p>Some materials are more suitable than others for making a product for a specific purpose.</p>	<p>Compare the properties of materials to determine what material is best suited for a specific purpose.</p> <p>Explain the relationship between suitability of materials and purpose.</p> <p>Select a material and use it to create an item for a specific purpose.</p> <p>Discuss the choice of material based on availability and purpose.</p>

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	Kindergarten			Grade 1			Grade 2		
Organizing Idea	Energy: Understandings of the physical world are deepened by investigating matter and energy.								
Guiding Question	How can objects, humans, and other animals move?			How can movement of objects and animals be understood?			Where do light and sound come from, and how do they move?		
Learning Outcome	Children explore movement of objects, humans, and other animals.			Students investigate direction, pathway, and speed of moving objects and animals.			Students investigate the behaviours of light and sound.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Movement is a change in position or location that happens over time.</p> <p>Objects can be moved in various ways, including</p> <ul style="list-style-type: none"> • straight lines • curves • circles • back and forth • zigzags • up and down • fast and slow <p>Humans and other animals can move in a variety of ways, such as</p> <ul style="list-style-type: none"> • flying • crawling • hopping • swimming 	<p>Objects, humans, and other animals can move or be moved in various ways.</p>	<p>Move objects in a variety of ways.</p> <p>Identify objects that move.</p> <p>Identify objects that do not move.</p> <p>Observe and imitate how animals can move.</p> <p>Identify various ways that humans and other animals can move.</p>	<p>Directions of movement can be described as</p> <ul style="list-style-type: none"> • up • down • forward • backward • sideways • toward • away from <p>A movement pathway is the path an object or animal follows when it moves.</p> <p>Movement pathways can be described as</p> <ul style="list-style-type: none"> • straight • curved • spiral • side to side <p>Objects or animals move along pathways in a variety of ways, such as</p> <ul style="list-style-type: none"> • rolling • bouncing • sliding <p>Speed can be described as</p> <ul style="list-style-type: none"> • fast • slow • changing • not changing 	<p>Movement consists of direction, a pathway, and speed.</p>	<p>Observe and describe the direction, pathway, and speed of objects or animals.</p> <p>Conduct an investigation to determine how objects move.</p> <p>Describe and record ways objects or animals move along different pathways.</p>	<p>Sound behaves in various ways, including</p> <ul style="list-style-type: none"> • travelling in a straight line from its source • transferring from one object to another • bouncing off a surface (reflection/diffusion) • stopping in an object (absorption) <p>Sound is produced by vibrations of objects.</p> <p>Vibration is a rapid back-and-forth movement.</p> <p>Sources of sound can be natural or human-made, such as</p> <ul style="list-style-type: none"> • musical instruments • speakers and headphones • vocal cords of humans and other animals • objects hitting each other <p>Characteristics of sound include</p> <ul style="list-style-type: none"> • volume, which can be described as quiet or loud • pitch, which can be described as high or low • duration, which can be described as 	<p>Behaviours of sound affect its characteristics.</p>	<p>Relate vibration to the production of sound.</p> <p>Identify sources of sound.</p> <p>Listen to sounds and describe their characteristics.</p> <p>Safely explore the production and behaviour of sound.</p> <p>Build a device to change the behaviour of sound.</p>

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							short or long Sound can travel through air, water, and some solids. Properties of materials that affect the production and behaviour of sound include <ul style="list-style-type: none"> • size • texture • shape • type 		

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	<p>Reasons for human and other animal movement include</p> <ul style="list-style-type: none"> • seeking food and water • exercising and playing • escaping danger 	<p>Humans and other animals move for many reasons.</p>	<p>Examine the reasons why humans and other animals move.</p>	<p>The movement of objects can be influenced by</p> <ul style="list-style-type: none"> • the shape of the object • the materials the object is made from • the surface texture of the object • interactions with other objects <p>Wheels can make objects easier to move.</p>	<p>The movement of objects can be influenced in a variety of ways.</p>	<p>Demonstrate how the movement of objects can be influenced.</p>	<p>Sources of light include</p> <ul style="list-style-type: none"> • the Sun • electricity • fire • some plants and animals (bioluminescence) <p>Light behaves in various ways, including</p> <ul style="list-style-type: none"> • travelling in a straight line from its source • bouncing off a surface (reflection) • bending as it travels from one material to another (refraction) • splitting into colours (dispersion) <p>Light travels through objects that can be seen through (transparent).</p> <p>The path of light is affected by mirrors, prisms, and water.</p> <p>The path of sunlight can be affected in a variety of ways by natural objects, such as</p> <ul style="list-style-type: none"> • leaves • trees • bodies of water • mountains 	<p>Behaviours of light affect its path.</p>	<p>Identify sources of light.</p> <p>Conduct an investigation to determine how the path of light can be affected.</p> <p>Examine how natural objects affect the path of sunlight.</p>

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Organizing Idea	Earth Systems: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.								
Guiding Question	How can environments be explored?			In what ways can environments change?			How can Earth's components and relationship to the Sun be understood?		
Learning Outcome	Children examine and describe surrounding environments.			Students analyze environments and investigate interactions and changes.			Students investigate Earth, its landforms, its bodies of water, and its relationship to the Sun.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Environment refers to physical surroundings.</p> <p>Environments include plants, humans, and other animals.</p> <p>Environments include human-made structures such as buildings and roads.</p> <p>Environments include land, water, and air.</p> <p>Environments can be explored using the senses.</p>	<p>Environments can be explored and wondered about.</p>	<p>Use the senses to make observations about environments.</p> <p>Ask questions about surrounding environments.</p> <p>Demonstrate respect while interacting with environments.</p> <p>Represent a local environment in nature.</p>	<p>The four seasons in Alberta are</p> <ul style="list-style-type: none"> • summer • autumn or fall • winter • spring <p>Some places have fewer than four seasons, such as</p> <ul style="list-style-type: none"> • two seasons: rainy and dry • three seasons: cool or cold, rainy, and dry <p>Many seasonal changes appear in environments, such as</p> <ul style="list-style-type: none"> • snow covering the ground • snow melting • the surface of lakes and other bodies of water freezing • rivers flowing fast or slow <p>Seasonal changes appear in plants and animals, such as</p> <ul style="list-style-type: none"> • camouflage in animals • leaves changing colour and falling • flowers blooming • crops and plants greening and growing 	<p>Changes in environments include seasonal changes.</p>	<p>Observe seasonal changes in local environments over time.</p> <p>Document signs of seasonal change over time.</p> <p>Share personal experiences related to seasons.</p> <p>Discuss how changes in the appearance of environments, plants, and animals are related to the seasons.</p> <p>Represent an environment in different seasons to show environmental changes.</p>	<p>Components of Earth include</p> <ul style="list-style-type: none"> • land • water • air • plants, humans, and other animals <p>At this time, Earth is the only planet known to support life.</p> <p>Scientists are looking for life on other planets and moons.</p>	<p>Earth consists of many components that support life.</p>	<p>Represent various components of Earth.</p> <p>Discuss how the various components of Earth interact to support life.</p>

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	Objects in environments can be natural or constructed by humans.	Environments are shared spaces that include a variety of objects.	<p>Identify natural and constructed objects in surrounding environments.</p> <p>Represent objects found in nature and those constructed by humans.</p>	<p>Migration is the regular movement patterns of animals from one area to another, usually in response to seasonal changes.</p> <p>Many animals migrate, such as</p> <ul style="list-style-type: none"> • whales • geese • polar bears • butterflies • caribou <p>Hibernation allows animals to survive the winter with little or no food, usually by sleeping for long periods of time.</p> <p>Many animals hibernate in winter, such as</p> <ul style="list-style-type: none"> • black bears and grizzly bears • groundhogs • some types of squirrels <p>Environments can undergo sudden changes, such as</p> <ul style="list-style-type: none"> • storms • floods • fires • winds 	Seasonal or sudden changes can affect the behaviour of animals.	<p>Investigate animal behaviour throughout the seasons, including migration and hibernation.</p> <p>Share personal experiences related to sudden changes in environments.</p>	<p>A landform is a natural feature of Earth's surface.</p> <p>Alberta has many different landforms, such as</p> <ul style="list-style-type: none"> • plateaus • mountains • valleys • hills • prairies <p>Landforms can be described as</p> <ul style="list-style-type: none"> • hilly • rocky • steep or flat • big or small <p>Some places and landforms in Alberta have been identified as UNESCO World Heritage Sites, such as</p> <ul style="list-style-type: none"> • Dinosaur Provincial Park • Wood Buffalo National Park • Head-Smashed-In Buffalo Jump 	Earth's surface consists of various types of landforms.	<p>Identify landforms that are found locally or in Alberta.</p> <p>Compare various landforms on Earth's surface.</p> <p>Identify and discuss UNESCO World Heritage Sites found in Alberta.</p>

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	<p>Changes can be observed in environments, such as</p> <ul style="list-style-type: none"> • temperature; e.g., hot, cold • sunlight; e.g., cloudy, sunny, day, night • human-made structures; e.g., new playground in a park • animals growing; e.g., tadpole becoming a frog • plants growing; e.g., grass getting taller 	<p>Environments change over time.</p>	<p>Observe a variety of local environments over time.</p> <p>Record observations of changes in environments.</p>	<p>Information can be gathered from environments using the senses.</p>	<p>Environments are observed and understood using the senses.</p>	<p>Describe various environments, drawing from information gathered using the senses.</p>	<p>Bodies of water on Earth's surface include</p> <ul style="list-style-type: none"> • oceans • glaciers • lakes • wetlands • rivers <p>Water flows downhill from smaller bodies of water to larger bodies of water in the following ways:</p> <ul style="list-style-type: none"> • small creeks flowing downhill and merging to form small streams • small streams merging to form larger streams and rivers • streams and small rivers merging to form larger rivers • large rivers merging into major waterways, such as oceans <p>Water found on Earth can be either fresh or salt water.</p> <p>Freshwater bodies include</p> <ul style="list-style-type: none"> • glaciers • most lakes • wetlands • rivers <p>Saltwater bodies include oceans and seas.</p>	<p>Earth's surface is mostly covered by bodies of water.</p>	<p>Investigate local and provincial bodies of water.</p> <p>Diagram the flow of water from small creeks to an ocean.</p> <p>Create a model to represent various types of landforms and bodies of water.</p> <p>Identify bodies of water on Earth that contain fresh water.</p> <p>Identify bodies of water on Earth that contain salt water.</p>

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	<p>Environments can be protected in many ways, such as</p> <ul style="list-style-type: none"> • reducing waste • reusing • recycling <p>Environments can be respected in many ways, such as</p> <ul style="list-style-type: none"> • not littering • caring for nature 	<p>Environments are important and should be protected and respected.</p>	<p>Discuss the importance of protecting and respecting environments.</p> <p>Identify ways to protect and respect environments.</p>	<p>Seasonal changes may affect a variety of choices and activities, such as</p> <ul style="list-style-type: none"> • clothing choices • recreational activities • Indigenous ceremonies • hunting and gathering 	<p>Seasonal changes influence decisions about daily activities.</p>	<p>Describe how seasonal changes affect decisions about daily activities.</p>	<p>A year is the length of time it takes Earth to revolve around the Sun.</p> <p>A day is the length of time it takes Earth to rotate fully (on its axis).</p> <p>Earth's surface experiences day when it faces the Sun, and night when it does not face the Sun.</p>	<p>Earth revolves around the Sun and rotates.</p>	<p>Describe the relationship between time and Earth revolving around the Sun.</p> <p>Represent ways that Earth's rotation connects to patterns of day and night.</p>
	<p>Connections can be fostered by physical locations, objects, and experiences in nature.</p> <p>First Nations, Métis, and Inuit ways of living include</p> <ul style="list-style-type: none"> • hunting • gathering • trapping • fishing • ceremonies 	<p>Feelings of connection and appreciation can be experienced in nature.</p> <p>First Nations, Métis, and Inuit ways of living connect to nature and the land.</p>	<p>Identify physical locations, objects, and experiences in nature that can lead to personal feelings of connection.</p> <p>Reflect on what is personally considered to be beautiful and appreciated in nature.</p> <p>Discuss connections First Nations, Métis, or Inuit have with nature.</p>	<p>The responsibility to care for environments is shared by all people and is fulfilled by showing respect for and protecting all aspects of nature.</p> <p>For First Nations, Métis, and Inuit, a sense of responsibility toward nature can be connected to place and traditional teachings for future generations, such as taking only what is needed.</p>	<p>Caring for nature comes from a sense of responsibility.</p>	<p>Discuss benefits of spending time in nature.</p> <p>Identify personal and group actions that demonstrate responsibility and care for nature.</p> <p>Discuss and reflect on First Nations, Métis, and Inuit traditional teachings that demonstrate a sense of responsibility to care for nature.</p>			

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Organizing Idea				Living Systems: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.					
Guiding Question				How do plants and animals survive?			How do plants and animals live and grow?		
Learning Outcome				Students investigate and examine needs of plants and animals.			Students investigate the growth and development of plants and animals and consider their relationship to humans.		
				Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
				<p>Plants are living things that can grow and make their own food.</p> <p>Plants usually cannot move from place to place.</p> <p>Animals are living things that can grow and that need to find food.</p> <p>Animals are usually able to move from place to place.</p> <p>Plants and animals exist in all shapes and sizes.</p> <p>Humans are part of nature and are classified as animals.</p>	Plants and animals share similarities and have differences.	<p>Share examples of plants and animals native to Alberta and Canada.</p> <p>Observe and describe similarities and differences between plants and animals.</p>	<p>Some human behaviours can positively affect plants and animals, such as</p> <ul style="list-style-type: none"> reducing, reusing, recycling, and repurposing recovering natural areas protecting natural spaces creating parks <p>Some human behaviours can negatively affect plants and animals, such as</p> <ul style="list-style-type: none"> littering polluting using up materials from nature that plants and animals need to live introducing plants and other animals that are not native to the area 	Plants and animals can be affected by human behaviour.	<p>Discuss ways to respect plants and animals while interacting in various environments.</p> <p>Explain positive and negative impacts of human behaviour on plants and animals.</p>

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				<p>A variety of plants and animals exist and are dispersed over Earth.</p> <p>Diverse plants and animals can be found in many environments in Alberta, such as</p> <ul style="list-style-type: none"> • forests • prairies • lakes and rivers • mountains <p>Basic needs of plants and animals include</p> <ul style="list-style-type: none"> • food • water • air • shelter 	Plants and animals require environments that allow them to meet their needs.	<p>Represent plants and animals in various environments.</p> <p>Determine how a local environment meets the basic needs of plants and animals.</p> <p>Discuss the movement of local animals from place to place to meet their needs.</p>	Offspring are the children of plants or animals.	Plants and animals share similarities with their offspring.	Identify similarities between offspring and their parents.
				<p>Ways humans can help meet the needs of plants or animals include</p> <ul style="list-style-type: none"> • watering plants • taking care of domestic animals • respecting environments <p>Ways that plants and animals, or their parts, help meet the needs of humans include providing</p> <ul style="list-style-type: none"> • air for breathing • food • clothing • shelter • medicine • connection (social/emotional) 	Humans, other animals, and plants depend on each other to meet their needs.	<p>Describe personal experiences related to how humans take care of plants and animals.</p> <p>Discuss how humans depend on plants and animals to meet their basic needs.</p> <p>Identify products made by various cultures, including local First Nations, Métis, or Inuit, that use plant and animal parts.</p>	<p>A life cycle shows the different stages of life that a plant or an animal goes through.</p> <p>Life cycles can be represented in many ways, such as</p> <ul style="list-style-type: none"> • illustrations • diagrams • models • stories 	Plants and animals have observable patterns or stages in their development.	<p>Represent the life cycles of various plants and animals.</p> <p>Discuss and compare life cycles of various plants and animals.</p>

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							<p>First Nations, Métis, and Inuit relate to land, plants, and animals as equals.</p> <p>Care and consideration for land, plants, and animals can be demonstrated through cultural practices, such as</p> <ul style="list-style-type: none"> • taking only what is needed • using the whole plant or animal • protecting water and soil • treating land, plants, and animals as relatives 	<p>The ways in which individuals or groups relate to land, plants, and animals can influence cultural practices.</p>	<p>Discuss how humans might interact with land, plants, and animals if they see land, plants, and animals as equals.</p> <p>Identify ways in which people show care for land, plants, and animals through cultural practices.</p>

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Organizing Idea	Computer Science: Problem solving and scientific inquiry are developed through the knowledgeable application of creativity, design, and computational thinking.								
Guiding Question	How can instructions be used?			How can instructions affect outcomes?			How can creativity support design?		
Learning Outcome	Children interpret instructions in various environments.			Students follow instructions and relate them to outcomes.			Students apply creativity when designing instructions to achieve a desired outcome.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Instructions are directions that can be followed.</p> <p>Instructions may be experienced in many different contexts, such as</p> <ul style="list-style-type: none"> • home • learning environments • games • experiences in nature <p>Instructions can be given in many ways and presented through</p> <ul style="list-style-type: none"> • speaking • pictures • gestures • traditional teachings 	<p>Following instructions can help people be safe, complete a task, and know what to do.</p>	<p>Recognize when actions do not correspond to instructions.</p> <p>Match an action to the corresponding instruction.</p> <p>Engage in activities that involve following instructions in various contexts.</p> <p>Identify instructions that help keep people safe in various contexts.</p> <p>Engage in activities that involve following instructions presented in various ways.</p>	<p>Instructions are directions that can be followed and given in various forms, including verbal, audio, visual, and written.</p>	<p>The form in which instructions are given may not affect the outcome.</p>	<p>Follow instructions with two or three steps given in different forms.</p>	<p>Creativity is the ability to generate something original, such as</p> <ul style="list-style-type: none"> • ideas • technology • tools • products <p>Creativity can be used to design instructions for</p> <ul style="list-style-type: none"> • games • sports • investigations • recipes • computer programs <p>Collaboration can result in improved ideas, which may enhance creativity and problem solving.</p>	<p>Instructions are designed using creativity and problem solving, which can be enhanced through collaboration.</p>	<p>Identify ways creativity is used to design instructions.</p>

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	Instructions have one or more steps.	The order in which instructions are followed can affect the outcome.	<p>Follow a sequence of two steps related to a learning experience.</p> <p>Identify differences in outcomes when the order of two steps is changed.</p> <p>Communicate a sequence of two steps for a given purpose.</p>	<p>Many types of instructions need to be in a specific order, such as</p> <ul style="list-style-type: none"> • directions • recipes • computer programs • safety protocols 	<p>Instructions are ordered in a way that will produce a desired outcome.</p>	<p>Determine if instructions with two or three steps given in different orders still produce the desired outcome.</p> <p>Sequence two or three instruction steps to achieve a desired outcome.</p> <p>Exchange ideas for creating three-step instructions that achieve a desired outcome.</p>	<p>Precise instructions have a variety of components, including</p> <ul style="list-style-type: none"> • verbs • simple language • clear steps • a starting and stopping point <p>Reliability of instructions means they consistently lead to the same desired outcome.</p> <p>Efficiency of instructions refers to designing in a way that yields desired outcomes with the least amount of energy, time, or steps.</p> <p>The reliability and efficiency of instructions can be affected by how they are communicated, including</p> <ul style="list-style-type: none"> • form; e.g., verbal, visual, written • order • clarity <p>Many people, individually or in groups, can create instructions, such as</p> <ul style="list-style-type: none"> • teachers • parents • students • computer programmers <p>Many activities at school and in the workplace require creativity and collaboration to improve ideas.</p> <p>Debugging is the</p>	<p>Instructions can be created to be precise, reliable, and efficient to achieve the desired outcome.</p>	<p>Work individually or in groups to create instructions using precise words, pictures, or diagrams.</p> <p>Create three-step to four-step instructions that achieve a desired outcome.</p> <p>Predict the outcome of instructions that have three to four steps.</p> <p>Refine instructions to more efficiently achieve a desired outcome.</p> <p>Test instructions with three to four steps to verify that a desired outcome is achieved.</p> <p>Debug any errors in a set of instructions to achieve a desired outcome.</p>

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							process of identifying and removing errors in a set of instructions to achieve a desired outcome. Debugging can increase the reliability of instructions.		

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				Following instructions is a way to demonstrate respect and safety during investigations.	Instructions help to keep people safe.	Follow instructions during investigations.	Many daily activities include repeated steps, such as <ul style="list-style-type: none"> • brushing teeth • tying one shoe and then using the same process on the other shoe 	Instructions may be simplified by repeating steps.	Describe a situation in which repetition simplifies instructions. Exchange ideas to design clear three- to four-step instructions, including repetition, to achieve a desired outcome.

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Organizing Idea				Scientific Methods: Investigation of the physical world is enhanced through the use of scientific methods that attempt to remove human biases and increase objectivity.					
Guiding Question				What is investigation?			What methods and processes can be used in scientific investigation?		
Learning Outcome				Students engage in and describe investigation.			Students examine investigation and explain how it is influenced by purpose.		
				Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
				<p>The skills and knowledge required to carry out an investigation can be learned.</p> <p>Investigations can be sparked by curiosity.</p> <p>Investigations are carried out by a variety of individuals or groups, such as</p> <ul style="list-style-type: none"> • teachers • students • scientists • police • doctors <p>Steps followed during an investigation include</p> <ul style="list-style-type: none"> • asking questions • making predictions • gathering data • forming conclusions <p>A prediction is a likely answer to a question based on current understanding.</p> <p>A conclusion is an answer to a question based on gathered data.</p>	Investigations are carried out to try to understand the world.	<p>Ask a question sparked by curiosity.</p> <p>Predict the answer to a question.</p> <p>Describe steps of an investigation.</p> <p>Demonstrate safety and respect during investigations.</p>	<p>Investigations are conducted for purposes such as</p> <ul style="list-style-type: none"> • answering questions • building knowledge • satisfying curiosity • problem solving <p>Procedures scientists use to guide investigations include</p> <ul style="list-style-type: none"> • asking questions • making predictions • planning the investigation • observing and recording data • analyzing data • reaching conclusions • discussing observations and conclusions 	Investigations involve carrying out procedures for a purpose.	<p>Explore various purposes for conducting an investigation.</p> <p>Describe procedures of an investigation.</p> <p>Develop questions for the purpose of an investigation.</p>

Science Kindergarten to Grade 6 Curriculum

	Kindergarten			Grade 1			Grade 2		
				<p>Observations can be made by using the senses.</p> <p>Observations can be recorded as data in many ways, such as</p> <ul style="list-style-type: none"> • words • drawings • photographs • numbers and counts • sound and video recordings <p>Scientists can keep records of data in record books or computers.</p>	<p>Recording data helps ensure observations can be referenced in the future.</p>	<p>Make observations using various senses.</p> <p>Record observations as data.</p> <p>Reflect on recorded data to make conclusions.</p>	<p>Data should relate to the purpose of an investigation.</p> <p>Observations and data should be similar if the investigation is repeated.</p> <p>Repetition of an investigation includes performing the same procedures in the same way.</p> <p>Data collected by people performing the same investigation can be combined.</p>	<p>Investigations can involve comparing data.</p>	<p>Determine if observations relate to the purpose of the investigation.</p> <p>Collaborate to combine recorded data into a single list or chart.</p> <p>Compare observations and data with others.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
Organizing Idea	Matter: Understandings of the physical world are deepened by investigating matter and energy.					
Guiding Question	How can materials change?			How can materials be managed safely?		
Learning Outcome	Students investigate and analyze how materials have the potential to be changed.			Students investigate the management of waste and dangerous materials and describe environmental impacts.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Processed materials are modified from natural materials and do not occur in nature.</p> <p>Processed materials are designed and manufactured for a specific purpose.</p> <p>First Nations, Métis, and Inuit communities respectfully interact with natural materials, such as</p> <ul style="list-style-type: none"> • trees • rocks • ice • shells • plants • animals <p>First Nations, Métis, and Inuit communities interact with natural materials for specific purposes, such as</p> <ul style="list-style-type: none"> • teepees • igloos • medicines • clothing • transportation • ceremonies 	<p>Materials can be used in their natural form or processed to create new materials.</p> <p>Interaction with natural materials by First Nations, Métis, and Inuit is guided through living in harmony and balance with the land.</p>	<p>Relate a processed material to the natural material from which it originated.</p> <p>Discuss how interaction with natural materials is guided by relationships with the land for First Nations, Métis, and Inuit communities.</p>	<p>Methods of waste management that can negatively impact the environment include using landfills and burning.</p> <p>Methods of waste management that can reduce negative environmental impacts include</p> <ul style="list-style-type: none"> • reducing • reusing • recycling • repurposing • repairing • composting <p>Increased production and consumption of materials leads to increased production of waste materials.</p> <p>Waste materials may be solids, liquids, or gases.</p>	<p>Responsible methods of waste management can reduce negative environmental impacts.</p>	<p>Compare the different methods of waste management and discuss their environmental impacts.</p> <p>Develop a personal plan to reduce waste.</p> <p>Discuss local waste management programs.</p> <p>Represent a recycling process using diagrams.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
	<p>Matter is anything that takes up space and has weight.</p> <p>States of matter include solid, liquid, and gas.</p> <p>Melting is a change of state from solid to liquid.</p> <p>Freezing is a change of state from liquid to solid.</p> <p>Evaporation is a change of state from liquid to gas.</p> <p>Condensation is a change of state from gas to liquid.</p>	<p>Matter can change state if heated or cooled.</p>	<p>Conduct an investigation to demonstrate changes of state.</p> <p>Discuss examples of daily activities that include heating and cooling.</p>	<p>Dangerous materials include natural and processed materials that can be harmful to the health of individuals.</p> <p>Symbols are used to identify dangerous materials.</p> <p>Hazard symbols are used to identify dangerous materials, including those that are</p> <ul style="list-style-type: none"> • explosive • flammable • corrosive • poisonous 	<p>Responsible use and disposal can reduce environmental impacts of dangerous materials.</p>	<p>Identify the hazard associated with symbols on various dangerous materials at home, at school, or in the community.</p> <p>Discuss responsible use and disposal of dangerous materials.</p>
	<p>A solid is a state of matter that has a definite shape and volume.</p> <p>A liquid is a state of matter that has a definite volume but no definite shape.</p> <p>A liquid flows and takes the shape of the container it is in.</p> <p>A gas is a state of matter that has neither definite shape nor definite volume.</p> <p>A gas flows easily and expands to the size of the container it is in.</p> <p>Volume is the amount of space a solid, liquid, or gas takes up.</p>	<p>Solids, liquids, and gases have distinct properties.</p>	<p>Describe solid, liquid, and gas states of matter in terms of the properties of shape and volume.</p> <p>Conduct an investigation to demonstrate the properties of the state of matter.</p>			

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
	<p>Substances are made of matter that has not been mixed with other matter, including water.</p> <p>The temperature at which a substance changes from solid to liquid is called the melting point.</p> <p>The temperature at which a substance changes from liquid to solid is called the freezing point.</p> <p>The melting and freezing points of a substance are the same temperature.</p> <p>The temperature at which a substance changes from liquid to gas is called the boiling point.</p> <p>The melting/freezing point of water is 0°C.</p> <p>The boiling point of water is 100°C.</p>	<p>Substances change state based on melting/freezing and boiling points.</p>	<p>Safely explore the melting/freezing points of various substances.</p> <p>Compare the melting/freezing and boiling points of various substances, including water.</p>			
	<p>The water cycle is a process in which water on Earth moves continuously between bodies of water, land, and the atmosphere.</p> <p>In the water cycle, water changes state from a liquid to a gas through evaporation, forms clouds through condensation, then falls back to Earth in a liquid or solid state (precipitation).</p> <p>Water can change state from solid to liquid and back again.</p> <p>Water can change state from liquid to gas and back again.</p> <p>In Alberta, the surfaces of many bodies of water change from liquid in the summer to solid in the winter.</p>	<p>The water on Earth moves continuously in a cycle.</p>	<p>Describe and diagram the changes of state of water using the water cycle.</p> <p>Discuss ways to respect water in local environments.</p> <p>Identify examples of changes in the state of water in local environments.</p> <p>Discuss the importance of safety around bodies of water that have a surface of ice.</p> <p>Discuss the importance of safety around bodies of water in different seasons.</p>			

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
	<p>A reversible change is a change that can be undone, such as melting or freezing.</p> <p>A permanent change is a change that cannot be undone, such as cooking an egg or baking a cake.</p>	<p>Changes to materials or substances can be permanent or reversible, depending on the properties of the given materials or substances.</p>	<p>Discuss examples of changes to materials or substances that are permanent and examples of changes to materials or substances that are reversible.</p> <p>Safely perform experiments on various materials and substances and classify changes as permanent or reversible.</p>			

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
Organizing Idea	Energy: Understandings of the physical world are deepened by investigating matter and energy.					
Guiding Question	How can forces relate to changes in movement?			How can forces affect objects from a distance?		
Learning Outcome	Students investigate and explain how forces affect the movement of objects.			Students investigate how forces can act on objects without contact.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>A force is a push or pull on an object resulting from an interaction with another object.</p> <p>An object that is not moving will stay still until a force makes it move, and an object that is moving will keep moving until a force stops it. (Newton’s First Law)</p> <p>Contact forces occur between objects that touch each other.</p> <p>Contact forces include forces that are</p> <ul style="list-style-type: none"> • applied by a person or an object on another object (applied) • caused by objects, surfaces, or substances sliding against each other (friction) • applied by pulling on a string or rope connected to an object (tension) • caused by a compressed or stretched object or spring (elastic or spring) <p>Ways to apply a contact force to an object include</p> <ul style="list-style-type: none"> • stretching • pulling • squeezing • pushing <p>The strength of forces applied to objects can be described as</p> <ul style="list-style-type: none"> • strong • weak • large • small <p>The direction of forces applied to objects can be described as</p> <ul style="list-style-type: none"> • upward 	<p>Forces can affect properties and movement of objects in different ways.</p>	<p>Describe where forces may exist in everyday situations.</p> <p>Describe the strength and direction of forces applied to objects.</p> <p>Compare the strength of forces applied to objects.</p> <p>Predict how an object will be affected by different strengths and directions of force.</p> <p>Conduct investigations to demonstrate the effects of forces on the movement of objects.</p> <p>Conduct investigations to demonstrate how forces can change the shape or size of objects.</p>	<p>Non-contact forces occur between objects that are not in direct contact.</p> <p>Gravity on Earth is a non-contact force that pulls objects toward the ground.</p> <p>Magnetic force is a non-contact force that attracts or repels magnetic materials.</p> <p>Magnetic materials contain iron, cobalt, or nickel.</p> <p>The strength of non-contact forces decreases as objects get farther apart.</p> <p>Non-contact forces can act through some materials.</p>	<p>Non-contact forces are invisible forces that can affect objects, materials, and substances.</p>	<p>Describe how non-contact forces affect objects.</p> <p>Demonstrate the effect of gravity on an object.</p> <p>Conduct an investigation to demonstrate magnetic forces on objects.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
	<ul style="list-style-type: none"> • downward • from the left • from the right • from both sides • from all directions <p>Changes to an object's movement when a force is applied include</p> <ul style="list-style-type: none"> • changing speed • starting • stopping • changing direction 					
	<p>The effort needed to move objects is reduced by simple machines, such as</p> <ul style="list-style-type: none"> • levers • wheels • inclined planes <p>Many First Nations, Métis, and Inuit designed, tested, and continue to use simple machines, such as</p> <ul style="list-style-type: none"> • an antler wedge • a paddle • Inuit scraping tools; e.g., ulu 	<p>Simple machines can change the strength and direction of forces.</p>	<p>Explore how simple machines reduce the effort needed to move objects.</p> <p>Design a device that uses simple machines.</p> <p>Safely work with tools, materials, and equipment.</p> <p>Describe the purpose of simple machines used by local First Nations, Métis, and Inuit.</p>	<p>Magnetic force is strongest at the magnetic poles.</p> <p>Magnets have two magnetic poles, known as north and south.</p> <p>Opposite magnetic poles attract each other and like magnetic poles repel each other.</p> <p>Both magnetic poles attract magnetic material.</p> <p>Some materials can become magnetized by interacting with a magnet.</p>	<p>Magnets interact with each other and magnetic material.</p>	<p>Analyze interactions between the magnetic poles of magnets.</p> <p>Magnetize a material using a magnet.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
Organizing Idea	Earth Systems: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.					
Guiding Question	What visible changes can be identified by examining Earth’s surface?			How does Earth sustain life?		
Learning Outcome	Students analyze changes in Earth’s surface and explain how its layers hold stories of the past.			Students investigate the systems of Earth and reflect on how their interconnections sustain life.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Changes that can occur to Earth’s surface over a long period of time include</p> <ul style="list-style-type: none"> • mountains wearing down • rivers changing course • lakes and seas drying out and refilling • glaciers moving, advancing, and receding <p>Natural events that can change Earth’s surface in a short period of time include</p> <ul style="list-style-type: none"> • volcanic eruptions • earthquakes • landslides • tsunamis • floods • melting and freezing <p>Changes to Earth’s surface can be shared through</p> <ul style="list-style-type: none"> • scientific knowledge • stories • traditional knowledge 	<p>Earth’s surface changes over time.</p> <p>Relationships with land provide intergenerational knowledge of Earth’s surface for many First Nations, Métis, and Inuit.</p>	<p>Describe how natural events change Earth’s surface.</p> <p>Discuss changes to Earth’s surface over time that are shared through stories and intergenerational knowledge of First Nations, Métis, or Inuit.</p> <p>Investigate natural events that have changed Earth’s surface in Alberta.</p>	<p>Earth scientists call Earth’s systems the spheres, including the</p> <ul style="list-style-type: none"> • lithosphere • atmosphere • hydrosphere • biosphere <p>The lithosphere</p> <ul style="list-style-type: none"> • is the outer layers of Earth’s surface • is made of rocks • contains soils and minerals that support life <p>The atmosphere</p> <ul style="list-style-type: none"> • is a gas layer that surrounds Earth • warms Earth’s surface • reduces extremes of temperature • contains oxygen, which is used for breathing <p>The hydrosphere is</p> <ul style="list-style-type: none"> • all areas of Earth that are covered with water • necessary for sustaining life <p>The biosphere includes all</p> <ul style="list-style-type: none"> • life on Earth • regions of Earth where life is supported <p>First Nations, Métis, and Inuit hold understandings of Earth systems that sustain life, including that all things are interconnected.</p>	<p>Earth’s systems interact with one another, resulting in environments that sustain life.</p>	<p>Make connections between human activity and Earth’s systems.</p> <p>Analyze the interconnectedness of Earth’s systems.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
				<p>Organisms require warmth and energy from the Sun to live.</p> <p>Sunlight is more direct at the equator than at the poles.</p> <p>The long-term temperature at the equator is warmer than it is at the poles.</p> <p>In Alberta, sunlight is more direct, and the length of daylight is longer, in summer than in winter.</p>	<p>Earth's surface is warmed by the Sun, allowing for life.</p>	<p>Describe the importance of the amount of sunlight and warmth on a variety of organisms.</p>
	<p>Wind, water, or ice can move or remove material as it flows.</p> <p>Glaciers are the remnants of very thick ice sheets that once covered all of Canada.</p> <p>Melting glacier ice creates runoff that forms and maintains many of the major rivers in Alberta.</p> <p>Earth is warming up from natural and human causes, which is accelerating the melting of glaciers.</p> <p>Interactions with wind and water have shaped Earth's surface, including Alberta's badlands and the Grand Canyon in the United States.</p>	<p>Water and wind can shape Earth's surface.</p>	<p>Represent how the movement of water and wind changes Earth's surface over time.</p> <p>Represent the flow of water from glaciers to an ocean.</p> <p>Investigate glacier-fed rivers that are found locally or in Alberta.</p>	<p>Water is a basic need for plants and animals.</p> <p>Water provides habitat for many organisms.</p> <p>First Nations, Métis, and Inuit laws of nature honour water as being sacred because water sustains life.</p> <p>Laws of nature guide First Nations, Métis, and Inuit in their responsibility to protect water and sources of water.</p> <p>First Nations, Métis, and Inuit laws of nature include</p> <ul style="list-style-type: none"> • how nature provides gifts of life • living in harmony with the land 	<p>Caring for water and water sources is a shared responsibility.</p>	<p>Discuss ways that plants and animals use water to meet their basic needs.</p> <p>Identify plants and animals that exist in various bodies of water.</p> <p>Demonstrate respect for water in the local environment.</p> <p>Discuss the importance of water to First Nations, Métis, and Inuit.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
				<p>Changes in one system that can impact another system include changes in</p> <ul style="list-style-type: none"> • number of organisms • food sources • habitat • water distribution and cleanliness • weather patterns <p>Governments, conservation groups, and First Nations, Métis, and Inuit communities collaborate with Parks Canada to conserve, restore, and protect Canada's natural and cultural heritages through initiatives such as</p> <ul style="list-style-type: none"> • culture camps • science camps • land management and preservation of important sites • cultural centres 	<p>Earth's systems are interconnected and can be impacted by small changes.</p>	<p>Explain how changes in one system can have impacts on other systems.</p> <p>Discuss the importance of governments, conservation groups, and First Nations, Métis, and Inuit communities working alongside Parks Canada.</p>
	<p>Human activities that can change Earth's surface include</p> <ul style="list-style-type: none"> • living on the land • building towns and cities • getting and using resources • growing crops and farming (agriculture) • polluting • stewardship <p>Plant and animal activities can change Earth's surface, such as</p> <ul style="list-style-type: none"> • overpopulation • using resources • parasite infestation; e.g., mountain pine beetle • animals burrowing 	<p>Plant, human, and other animal activities can cause changes to Earth's surface.</p>	<p>Relate human activities to changes in Earth's surface.</p> <p>Relate activities of plants and animals to changes in Earth's surface.</p> <p>Discuss the interconnectedness between human activities and responsibilities for maintaining Earth.</p> <p>Investigate how changing Earth's surface by farming and growing crops contributes to daily life in Alberta.</p>	<p>Natural resources are materials from nature that are used to meet human needs, and include</p> <ul style="list-style-type: none"> • air • water • soil • minerals • metals • forests • organisms 	<p>Earth's systems include natural resources that are central to human well-being.</p>	<p>Investigate natural resources found in Alberta and how they are used to meet human needs.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
	<p>Earth's surface contains layers that have been deposited over long periods of time.</p> <p>Fossilized dinosaur bones found in many locations around the world show that dinosaurs lived on Earth millions of years ago.</p> <p>Millions of years ago, Earth's surface in Alberta included lush tropical forests and an inland sea that supported dinosaur life and the preservation of dinosaur bones.</p> <p>Fossilized dinosaur bones can be collected from the surfaces of Earth or by digging up (excavating) its layers.</p> <p>Fossilized dinosaur bones have been found in several locations in Alberta, such as</p> <ul style="list-style-type: none"> • Alberta's badlands • the Grande Cache area • the Fort McMurray area <p>Dinosaur Provincial Park, located in Alberta's badlands, has been classified as a UNESCO World Heritage Site.</p> <p>Many dinosaurs lived in Alberta, such as</p> <ul style="list-style-type: none"> • Albertosaurus • Edmontosaurus • Nodosaurus • Tyrannosaurus <p>Displays of fossilized dinosaur bones can be viewed in museums in Alberta such as the</p> <ul style="list-style-type: none"> • Royal Tyrrell Museum in Drumheller • Philip J. Currie Dinosaur Museum in Wembley <p>A scientist who studies fossilized dinosaur bones is called a paleontologist.</p>	<p>The history of Earth's surface can be explained by examining its layers.</p>	<p>Examine how layers of Earth's surface hold information about the past.</p> <p>Explain how paleontologists know that dinosaurs lived on Earth millions of years ago.</p> <p>Investigate fossilized dinosaur bones that have been found in Alberta and the dinosaurs they belong to.</p> <p>Identify and discuss where fossilized dinosaur bones have been found or are on display in Alberta.</p>	<p>Conservation is the preservation and protection of Earth's systems from pollution, depletion, or extinction.</p> <p>Conservation practices can be implemented in natural and human-made areas.</p> <p>Conservation can involve creating local, provincial, and national parks.</p> <p>First Nations, Métis, and Inuit have a long history with the land that has informed conservation practices and beliefs.</p>	<p>Conservation can impact land, natural resources, and organisms.</p> <p>Many First Nations, Métis, and Inuit practise traditional methods of conservation, including taking only what is needed.</p>	<p>Investigate conservation practices in natural and human-made areas.</p> <p>Discuss the interconnectedness between human use of parks and conservation practices.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
	<p>Soil includes</p> <ul style="list-style-type: none"> • living plants and animals • decaying plants and animals • rock particles • air • water <p>Soil provides a habitat for many animals.</p> <p>Habitats are environments where plants or animals establish a home.</p> <p>Soil can change due to the influence of plants and animals, such as</p> <ul style="list-style-type: none"> • plants and crops growing • worms tunneling and eating matter 	<p>Soil is a continually changing upper layer of Earth's surface.</p>	<p>Examine soil and its components in the local community.</p> <p>Identify local habitats provided by soil.</p> <p>Describe how soil is changed by plants and animals.</p>	<p>Conservation can be practised through personal actions, including</p> <ul style="list-style-type: none"> • use of electricity; e.g., turning off lights when leaving a room • use of water; e.g., taking shorter showers • reducing waste; e.g., using reusable packaging <p>Conservation can be practised through community or global actions, such as</p> <ul style="list-style-type: none"> • use of energy-efficient alternatives; e.g., solar panels • supplying water to support crops (irrigation) • community recycling or composting programs 	<p>Conservation of Earth's systems involves personal, community, and global action.</p>	<p>Describe examples of personal actions that contribute to conservation in daily life.</p> <p>Create a plan to implement a conservation practice in a local community.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
Organizing Idea	Living Systems: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.					
Guiding Question	How do plants and animals interact?			In what ways do the structures of organisms support survival?		
Learning Outcome	Students analyze and describe how plants and animals interact with each other and within environments.			Students analyze organisms and relate external structures to functions.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>A food chain shows the order in which plants and animals depend on each other for food.</p> <p>A food chain can be represented in many ways, such as</p> <ul style="list-style-type: none"> • illustrations • diagrams • stories • words <p>A food chain represents one possible way that plants and animals interact.</p> <p>Plants and animals are part of many different food chains.</p>	<p>Plants and animals interact with each other in various environments in ways that can be represented with food chains.</p>	<p>Represent various food chains in local and other Canadian environments.</p>	<p>Organisms are living things that respond to stimuli and include plants, humans, and other animals.</p> <p>Organisms can be classified in various ways, including by</p> <ul style="list-style-type: none"> • appearance • habitat • structures <p>Structures, including body parts, are features of organisms that serve a purpose or function.</p> <p>Organisms have external structures that can vary; e.g.,</p> <ul style="list-style-type: none"> • plants may have roots, stems, leaves, flowers, fruit, or other structures • animals may have claws, teeth, legs, shells, skins, or other structures <p>Functions of external structures in an organism include</p> <ul style="list-style-type: none"> • eating • moving • protecting • sensing • reproducing 	<p>A variety of organisms live on Earth and have external structures that support various functions.</p>	<p>Find and classify examples of local plants and animals based on appearance, habitat, and structures.</p> <p>Demonstrate respect when interacting with plants and animals in local environments.</p> <p>Relate the external structures of plants to their functions.</p> <p>Relate the external structures of animals to their functions, excluding reproduction.</p> <p>Compare external structures of various plants and animals in relation to function.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
	<p>Carnivores eat only animals.</p> <p>Herbivores eat only plants.</p> <p>Omnivores eat both animals and plants.</p>	<p>Animals can be classified as carnivores, herbivores, or omnivores based on what they eat.</p>	<p>Classify animals in a food chain as carnivores, herbivores, or omnivores.</p>	<p>Plants can detect sensory stimuli, such as light, gravity, temperature, and touch, which help them grow and survive.</p> <p>Sensory organs of animals include</p> <ul style="list-style-type: none"> • ears • eyes • nose • tongue • skin <p>Sensory organs in animals help them meet their needs in various ways, such as by detecting</p> <ul style="list-style-type: none"> • food • other animals • danger • temperature 	<p>Organisms sense and respond to their environments to support growth and survival.</p>	<p>Discuss how plants respond to sensory stimuli.</p> <p>Relate sensory organs of animals to their survival.</p> <p>Conduct an investigation to determine if an organism senses and responds to changes in an environment.</p>
	<p>Plants and animals use their senses to respond to sensory stimuli, including</p> <ul style="list-style-type: none"> • water • food • temperature • light <p>Animals can use senses to detect the presence of food, predators, or other plants and animals.</p>	<p>Plants and animals sense and respond to stimuli in order to survive.</p>	<p>Investigate and discuss how plants and animals respond to stimuli in their environments in order to survive.</p>			

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
	<p>Plants and animals in local environments can be protected by actions such as</p> <ul style="list-style-type: none"> • respectfully interacting with nature • minimizing disturbance to plants and animals • being aware of animal crossings • following fishing and hunting regulations • counting and tracking populations <p>Plants and animals may depend on each other and their environments for survival, such as for food and habitat.</p> <p>First Nations, Métis, and Inuit knowledge of plants and animals within environments includes</p> <ul style="list-style-type: none"> • animal behaviour • sources of food • migration patterns • seasonal patterns 	<p>Awareness and consideration of the interactions of plants and animals in local environments helps humans protect them.</p>	<p>Reflect on and share actions that can be taken to protect plants and animals in local environments.</p> <p>Demonstrate respectful and safe practices during observations of plants and animals in local environments.</p> <p>Explain interconnections in environments, including how plants depend on animals and how animals depend on plants to survive.</p> <p>Discuss First Nations, Métis, and Inuit connection with environments and their knowledge of and relationships with plants and animals.</p>			

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
Organizing Idea				Space: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.		
Guiding Question				How do objects in space impact daily life?		
Learning Outcome				Students investigate and describe objects in space in connection to daily life.		
				Knowledge	Understanding	Skills & Procedures
				<p>The universe includes all of space and everything in it.</p> <p>Objects in space include</p> <ul style="list-style-type: none"> • the Moon • the Sun (a star) • stars and their planets • planets and their moons <p>Most objects in space are more easily observed at night.</p> <p>Technologies for viewing objects in space include</p> <ul style="list-style-type: none"> • binoculars • telescopes • planetariums <p>Safe viewing of the Sun requires appropriate safety equipment and precautions to avoid damage to the eyes.</p>	<p>Observing objects in space helps us connect Earth to its place in the universe.</p>	<p>Record observations of objects in space using appropriate safety equipment when necessary.</p> <p>Compare observations of objects in space taken during the day and night.</p> <p>Compare technologies for viewing objects in space.</p>
				<p>Constellations are groups of stars that appear to form a shape.</p> <p>Constellations have names that come from a variety of sources.</p> <p>Stars in the same constellation may be millions of kilometres apart.</p> <p>Earth's daily rotation and yearly revolution around the Sun causes the constellations to appear in different locations at different times.</p> <p>Polaris, the North Star, shows the approximate direction of the North Pole.</p> <p>The Orion constellation can be used to find the South Pole.</p>	<p>Stars and constellations are recognizable from Earth and can be used for navigation and tracking the passage of time.</p>	<p>Examine constellations in relation to location in the sky.</p> <p>Explain ways in which stars can be used for navigation.</p> <p>Explore the local traditional names of the North Star.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
				<p>The Moon has been used throughout history to measure time.</p> <p>The international standard (Gregorian) calendar is based on the amount of time it takes Earth to revolve around the Sun.</p> <p>Most people follow the international standard calendar in daily life.</p> <p>Some cultures may use a lunar calendar in addition to the international standard calendar.</p> <p>Lunar calendars follow patterns of the Moon for timekeeping.</p>	<p>Many cultures connect observations of objects in space to time, place, and daily life in various ways.</p>	<p>Represent observations of objects in space as they connect to seasons, plants, and animals in a local area.</p> <p>Discuss similarities and differences between a lunar calendar and the international standard calendar.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
Organizing Idea	Computer Science: Problem solving and scientific inquiry are developed through the knowledgeable application of creativity, design, and computational thinking.					
Guiding Question	How does creativity contribute to computational thinking?			How can design meet needs?		
Learning Outcome	Students investigate creativity and its relationship to computational thinking.			Students examine and apply design processes to meet needs.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Computational thinking includes</p> <ul style="list-style-type: none"> • breaking a task into smaller chunks • finding patterns and similarities in tasks • identifying the important details when reading or solving a problem • designing instructions • working backward if a mistake is made <p>Computational thinking can be used by humans to communicate with computers more efficiently; e.g., apps, virtual reality, and robotics.</p>	<p>Computational thinking is a problem-solving process that uses creativity.</p>	<p>Create a set of instructions that could be followed by a human or a machine to complete a task.</p> <p>Identify computational thinking used to solve problems or achieve desired outcomes.</p>	<p>Design processes include</p> <ul style="list-style-type: none"> • understanding the problem • forming ideas (ideating) • planning • creating • analyzing • testing • troubleshooting <p>Feedback helps to ensure all needs are considered during the design process.</p> <p>An algorithm is a sequence of instructions.</p> <p>Artifacts are objects or products made by humans, machines, or computers through the process of design.</p> <p>Design can produce many artifacts, including</p> <ul style="list-style-type: none"> • algorithms • models • prototypes • blueprints • programs • experiments • objects <p>Design can deal with complex problems.</p> <p>Availability of materials and costs are considerations in design.</p>	<p>Design involves processes that can transform ideas into artifacts that meet needs.</p>	<p>Plan and create an artifact to meet a need.</p> <p>Provide feedback to others during the design process.</p> <p>Test an artifact to confirm that it meets intended needs.</p> <p>Collaborate to design an algorithm to solve a problem.</p> <p>Examine availability and cost of materials during design.</p>

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	Grade 3			Grade 4		
	<p>The same outcome, such as arriving at school, can be achieved in different ways.</p> <p>Divergent thinking is the process of generating multiple unique ideas or solutions.</p> <p>Creativity is an important part of computer science, technology, and engineering; e.g., computer programming, robotics.</p> <p>Creativity involves combining, changing, or reapplying existing ideas to produce something new.</p> <p>Canadians are responsible for many creative inventions, such as the Canadarm.</p>	<p>Creativity involves divergent thinking and can be used to develop different ways to achieve the same outcome.</p> <p>Creativity involves imagination, observation, and making connections.</p>	<p>Collaborate to write two different sets of instructions that achieve the same outcome.</p> <p>Relate creativity to engineering, computing, and the development of new technologies.</p> <p>Create something new by combining, changing, or reapplying existing ideas.</p> <p>Examine a Canadian invention.</p> <p>Identify examples of creativity in computer science, technology, or engineering.</p>			

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
Organizing Idea	Scientific Methods: Investigation of the physical world is enhanced through the use of scientific methods that attempt to remove human biases and increase objectivity.					
Guiding Question	How can investigation help to deepen understanding in science?			How can evidence advance knowledge in science?		
Learning Outcome	Students relate investigation to building knowledge.			Students investigate evidence and reflect on its role in science.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Techniques that can be used to improve the accuracy of data include choosing appropriate tools, carefully measuring, and demonstrating objectivity.</p> <p>Accuracy of data refers to the correctness of a recorded observation.</p> <p>Objectivity is an attempt to remove the influence of personal thoughts, feelings, and expectations.</p> <p>Data can come from many sources, such as</p> <ul style="list-style-type: none"> • investigations • texts • websites • Elders or Knowledge Keepers • community members • personal observations <p>Data can be considered accurate when it comes from a trustworthy source, such as</p> <ul style="list-style-type: none"> • textbooks • scientific articles (peer-reviewed journals) • official government websites • Elders or Knowledge Keepers <p>Data can be analyzed by</p> <ul style="list-style-type: none"> • making connections to previous knowledge • comparing for accuracy • asking questions • noticing changes • discussing • collaborating <p>Analysis of data can spark new questions for investigation.</p>	<p>Investigations build on previous knowledge by supporting or contradicting existing knowledge.</p>	<p>Reflect on how conducting an investigation contributes to building knowledge.</p> <p>Collect data using techniques to improve the accuracy of data.</p> <p>Analyze data collected during investigations.</p> <p>Compare the trustworthiness of sources of data.</p> <p>Develop new questions for further investigations.</p>	<p>Data can be descriptive and expressed using words (qualitative).</p> <p>Data can be measured and expressed using numbers and counts (quantitative).</p> <p>Descriptive and expressive oral narratives include numbers or counts.</p> <p>Relevant data addresses the question that is being investigated.</p> <p>Some observations and data are not relevant to the question being investigated.</p> <p>All relevant data must be considered.</p> <p>Evidence is produced through the study and interpretation of data.</p> <p>Data can be represented as evidence in multiple ways, including</p> <ul style="list-style-type: none"> • written texts • verbal presentations • oral traditions • graphs • tables • charts • diagrams • simulations • models <p>Système international d'unités (international system of units) is a common system of measurement used to communicate data and evidence.</p> <p>Système international d'unités can</p>	<p>Ongoing collection of evidence provides a way to expand and adjust previous knowledge.</p>	<p>Decide whether to collect descriptive or measured data during an investigation.</p> <p>Interpret data collected from investigations.</p> <p>Interpret data and evidence expressed in SI units.</p> <p>Represent evidence from an investigation in a variety of ways.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 3			Grade 4		
				be abbreviated as SI.		
				<p>Reliability refers to consistency of data and evidence.</p> <p>Reliability of evidence can be affected by the amount of data collected and whether the data can be reproduced.</p> <p>Validity refers to how accurately data and evidence reflect what is supposed to be described or measured.</p> <p>Data can be measured more accurately using tools or technology.</p>	<p>Conclusions drawn during investigation must be based on reliable and valid evidence.</p>	<p>Collect reliable data during investigations.</p> <p>Draw conclusions using reliable and valid evidence from investigations.</p> <p>Collect valid data by accurately using tools or technology during investigations.</p> <p>Discuss tools or technology used to improve accuracy during investigations.</p> <p>Collaborate to evaluate the reliability and validity of a collection of data.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 5			Grade 6		
Organizing Idea	Matter: Understandings of the physical world are deepened by investigating matter and energy.					
Guiding Question	How can states of matter and other physical properties be explained using the particle model of matter?			How can the particles of matter be influenced by heating or cooling?		
Learning Outcome	Students investigate the particle model of matter in relation to the physical properties of solids, liquids, and gases.			Students investigate how particles of matter behave when heated or cooled and analyze effects on solids, liquids, and gases.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Ideas represented by the particle model of matter include that:</p> <ul style="list-style-type: none"> • all matter is made up of small particles • particles of matter are always moving • particles of matter have spaces between them <p>In solids, the particles are close together and vibrate in place.</p> <p>In liquids, the particles are separated by spaces and can slide past each other.</p> <p>In gases, the particles are separated by large spaces and are constantly moving in all directions.</p> <p>Attractive forces between particles are strongest in solids and weakest in gases.</p>	<p>The particle model of matter explains the behaviour of particles in matter.</p>	<p>Represent solids, liquids, and gases using the particle model of matter.</p> <p>Relate the movement and arrangement of particles to the state of matter.</p> <p>Describe the impact that attractive forces have on the movement and arrangement of particles in solids, liquids, and gases.</p>	<p>The particle model of matter states that heating matter causes particles to move faster.</p> <p>As particles move faster, the attractive forces between them weaken and the space between them increases.</p> <p>The particle model of matter states that cooling matter causes particles to move slower.</p> <p>As particles slow down, the attractive forces between them increase and the space between them decreases.</p> <p>A phase change is a change from one state of matter to another.</p> <p>During a phase change, the volume of the matter may change but the mass remains constant.</p>	<p>Particles change speed and distance from each other when heated or cooled.</p>	<p>Discuss the connection between movement of particles and temperature in degrees Celsius.</p> <p>Explain phase changes of matter when heated or cooled using the particle model of matter.</p> <p>Conduct a controlled experiment to prove the mass of a substance is the same after a phase change.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 5			Grade 6		
	<p>Physical properties of matter include</p> <ul style="list-style-type: none"> • state • mass • volume • density • compressibility <p>Mass is the amount of matter in a solid, liquid, or gas.</p> <p>SI units of mass include grams and kilograms.</p> <p>Volume is the amount of space a solid, liquid, or gas takes up.</p> <p>SI units of volume of a liquid include millilitres and litres.</p> <p>SI units are abbreviated for convenience, including</p> <ul style="list-style-type: none"> • g: grams • kg: kilograms • mL: millilitres • L: litres <p>Density is a comparison of the mass of a solid, liquid, or gas to its volume.</p> <p>The greater the mass of a solid, liquid, or gas as compared to its volume, the higher its density.</p> <p>Density can be described comparatively using the phrases denser and less dense.</p> <p>Density can be directly compared by determining</p> <ul style="list-style-type: none"> • the relative mass of objects with the same volume • if a liquid sinks or floats when added to another liquid <p>A solid, liquid, or gas that is less dense than the fluid in which it is placed will float.</p> <p>Compressibility is the ability of a liquid or gas to reduce in volume</p>	<p>The movement and arrangement of particles affect the physical properties of matter.</p>	<p>Measure the mass of solids and liquids using a balance scale and SI units.</p> <p>Measure the volume of liquids using appropriate instruments and SI units.</p> <p>Directly compare the density of solid objects that have the same volume.</p> <p>Directly compare the density of liquids.</p> <p>Relate densities of solids, liquids, and gases using the particle model of matter.</p> <p>Compare the compressibility of air and water.</p> <p>Practise safe and appropriate use of materials, tools, and equipment.</p>	<p>A liquid thermometer uses the expansion or contraction of matter to measure temperature using a scale.</p> <p>Scientists use the Celsius scale to measure temperature in degrees Celsius (°C).</p> <p>The Celsius scale is based on the changes of state of water and defines 0°C as the melting/freezing point of water and 100°C as the boiling point of water.</p>	<p>Expansion and contraction of matter can be the basis for the design of tools that measure temperature.</p>	<p>Describe how a liquid thermometer works.</p> <p>Create a tool that measures temperature based on expansion and contraction of a liquid.</p> <p>Relate the melting/freezing and boiling points of water to the Celsius scale.</p> <p>Identify safety practices associated with measuring temperature and the use of measurement tools.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 5			Grade 6		
	when under pressure.					

Science Kindergarten to Grade 6 Curriculum

	Grade 5			Grade 6		
				<p>Expansion is the typical response materials have to heating.</p> <p>Contraction is the typical response materials have to cooling.</p> <p>Water has the unusual property of having greater volume in solid form than in liquid form.</p> <p>Because of water's unusual property, it is less dense in solid form than in liquid form.</p> <p>The surface of a body of water freezes when the temperature of the water drops below the freezing point.</p> <p>The frozen surface of a large body of water forms an insulating sheet of ice that protects aquatic life.</p> <p>A material's response to temperature change requires consideration when designing and constructing infrastructure, including</p> <ul style="list-style-type: none"> • sidewalks • bridges • roads 	<p>Most matter expands when heated and contracts when cooled.</p>	<p>Conduct an investigation to demonstrate that liquid water is denser than solid water.</p> <p>Hypothesize the effect on aquatic life if solid water were denser than liquid water.</p> <p>Explain the significance of expansion or contraction in the design and construction of structures.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 5			Grade 6		
Organizing Idea	Energy: Understandings of the physical world are deepened by investigating matter and energy.					
Guiding Question	How are forces similar and different in water and air?			In what ways can interactions lead to physical change?		
Learning Outcome	Students investigate and compare how forces affect living things and objects in water and air.			Students analyze forces and relate them to interactions between objects.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Thrust and drag are opposing forces.</p> <p>Lift and weight are opposing forces.</p> <p>Thrust is a force that can act in the direction of movement.</p> <p>Drag is a force that can act in opposition to the direction of movement.</p> <p>Lift is an upward force that acts to overcome the weight of a living thing or object and hold it in the air.</p> <p>Weight is a force caused by gravity that acts on a living thing or object in a downward direction.</p> <p>Forces can affect the flight of living things and objects in various ways, including</p> <ul style="list-style-type: none"> • speed • horizontal and vertical movement • altitude • straight and level flight <p>Traditional technologies developed by diverse cultures that reflect understanding of forces that affect flight include the</p> <ul style="list-style-type: none"> • bow and arrow • slingshot • fishing spear 	<p>Flight of living things and objects is influenced by opposing forces.</p>	<p>Diagram opposing forces that act on living things or objects in flight.</p> <p>Explain the effects of thrust and drag on the flight of living things and objects.</p> <p>Explain the effects of lift and weight on the flight of living things and objects.</p> <p>Observe living things and objects in flight.</p> <p>Describe traditional or modern technologies developed by diverse cultures that reflect understanding of forces that affect flight.</p> <p>Construct a device that can fly.</p> <p>Practise safe and appropriate use of tools, equipment, and materials while constructing a device.</p>	<p>Forces within an object are internal forces, including</p> <ul style="list-style-type: none"> • tension • compression • shear • torsion <p>Forces that act on an object from outside the object are external forces, including</p> <ul style="list-style-type: none"> • applied force • friction • elastic or spring force <p>External forces cause internal forces within an object.</p> <p>An applied force is exerted on an object by a person or another object.</p> <p>Friction forces oppose the movement of objects when those objects make contact with other objects or surfaces.</p> <p>Tension is a force exerted by pulling on a string or rope that is connected to an object.</p> <p>Elastic or spring force is exerted on any object that is in contact with a compressed or stretched elastic object or spring.</p> <p>Compression is a force exerted on an object that squeezes, squashes, or compacts the object.</p> <p>Shear is a force that pushes parts of an object in opposite directions, resulting in bending or breaking.</p> <p>Torsion is a force that twists an</p>	<p>External and internal forces can change the shape, size, or position of objects that interact.</p> <p>Identify forces that act on an object during an interaction.</p> <p>Use materials, tools, and equipment safely while experimenting with forces in interactions.</p>	<p>Conduct investigations to answer questions about the effects of external and internal forces on objects during an interaction.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 5			Grade 6		
				object.		
	<p>Buoyant force is an upward force exerted by a fluid that opposes the weight of anything placed in the fluid.</p> <p>When the buoyant force is greater than the weight of an object, the object will float.</p> <p>When the buoyant force is less than the weight of an object, the object will sink.</p> <p>Fluids include liquids and gases.</p>	<p>The relationship between buoyant force and gravity can be used to explain the behaviour of an object in water.</p>	<p>Relate buoyant force and weight to the tendency to float or sink in water.</p> <p>Conduct controlled experiments to determine if various objects and materials float in different fluids.</p> <p>Construct a device that can float.</p> <p>Practise safe and appropriate use of tools, equipment, and materials while constructing a device.</p>	<p>Plasticity is a property that leads to permanent changes in an object's shape; e.g., bending a paper clip.</p> <p>Elasticity is a property that enables temporary changes in an object's shape; e.g., stretching a rubber band.</p>	<p>Changes in an object's shape depend on its properties.</p>	<p>Differentiate between temporary and permanent changes.</p> <p>Test the plasticity and elasticity of objects.</p>
				<p>An action force is exerted on an object in a particular direction.</p> <p>A reaction force acts in the opposite direction of an action force.</p> <p>One object experiences an action force while another object experiences a reaction force in an interaction.</p>	<p>For every action force, there is an equal and opposite reaction force. (Newton's Third Law)</p>	<p>Demonstrate and represent an action force and its reaction force in various interactions.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 5			Grade 6		
Organizing Idea	Energy: Understandings of the physical world are deepened by investigating matter and energy.					
Guiding Question	How are energy resources understood?			How are energy resources used?		
Learning Outcome	Students investigate and analyze various energy resources.			Students investigate energy resources and explain factors that influence their use.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Energy resources are renewable or non-renewable.</p> <p>Renewable energy resources are not depleted over time as they can be naturally replenished if handled responsibly.</p> <p>Renewable energy resources include</p> <ul style="list-style-type: none"> • solar • wind • biomass • geothermal • tidal • water and hydro <p>Non-renewable energy resources are depleted over time because they will not be naturally replenished for thousands or millions of years.</p> <p>Non-renewable energy resources include nuclear and fossil fuels.</p> <p>Alberta relies on both renewable and non-renewable energy resources to fulfill energy needs, including</p> <ul style="list-style-type: none"> • fossil fuels • water and hydro • wind • biomass 	<p>Humans rely on energy resources to fulfill energy needs.</p>	<p>Compare renewable energy resources with non-renewable energy resources.</p> <p>Discuss advantages and disadvantages of using renewable and non-renewable energy resources.</p> <p>Examine how various provinces and territories throughout Canada fulfill energy needs.</p>	<p>Factors that influence selection of energy resources include</p> <ul style="list-style-type: none"> • availability and accessibility • societal impacts • economic impacts • environmental impacts 	<p>The advantages and disadvantages of several factors influence selection of energy resources.</p>	<p>Investigate factors that influence selection of energy resources.</p> <p>Examine factors that influence selection of principal energy resources used in Alberta.</p>

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Grade 5			Grade 6			
				<p>Responsible management of energy resources includes</p> <ul style="list-style-type: none"> • minimal disruption to nature • restoration of extraction areas • waste management practices • respect for land and resource rights <p>Some energy resources can be used before processing, such as</p> <ul style="list-style-type: none"> • wood • wind • water <p>Some energy resources can be used after processing, such as</p> <ul style="list-style-type: none"> • wind • solar • fossil fuels • nuclear • hydro • biofuel <p>Many energy resources are processed into electricity.</p> <p>Some energy resources can be used before processing and after processing; e.g., wind can be used before processing to sail a boat and after processing as electricity.</p> <p>Energy resources can be used in daily life in various ways, such as</p> <ul style="list-style-type: none"> • heating and cooling • lighting • cooking • transportation 	<p>Energy resources can be managed for use in daily living.</p>	<p>Examine management of energy resources in various contexts.</p> <p>Classify energy resources as being used before or after processing.</p> <p>Compare the use of an energy resource before and after processing.</p> <p>Discuss ways energy resources are used by individuals or communities in daily life.</p> <p>Design a device that uses an energy resource, before or after processing, to solve a problem.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 5			Grade 6		
Organizing Idea	Earth Systems: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.					
Guiding Question	How can climate and its effects be understood?			What relationships exist between climate and changes on Earth?		
Learning Outcome	Students analyze climate and connect it to weather conditions and agricultural practices.			Students investigate climate, changes in climate, and the impact of climate change on Earth.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Weather is the short-term conditions experienced in a region, including</p> <ul style="list-style-type: none"> • temperature • wind speed and direction • amount of sunlight • precipitation • humidity • cloud cover <p>Climate is the long-term weather patterns of a region over a period of at least 30 years.</p> <p>Data in maps, tables, or graphs can be used to represent key characteristics of climate, including</p> <ul style="list-style-type: none"> • temperature • precipitation • humidity • wind <p>Climates are dependent on factors that include</p> <ul style="list-style-type: none"> • geographical location • landforms • altitude • proximity to bodies of water <p>Climate zones are defined areas with distinct climates and include</p> <ul style="list-style-type: none"> • tropical • dry • temperate • polar • continental <p>First Nations, Métis, and Inuit can provide long-term observations of climate for local context.</p>	<p>The study of climates across regions helps identify historical patterns and make predictions.</p>	<p>Distinguish climate from weather.</p> <p>Discuss the characteristics of local, national, and global weather conditions to determine climate.</p> <p>Compare key characteristics of climate zones.</p> <p>Interpret data about climate.</p> <p>Relate factors that contribute to Alberta’s climate.</p> <p>Compare Alberta’s climate to the climates of other Canadian provinces or territories.</p>	<p>Earth’s systems interact with the Sun and each other to impact climate in various ways, including</p> <ul style="list-style-type: none"> • clouds reflecting sunlight into space • greenhouse gases trapping heat from the Sun • ice reflecting light from the Sun <p>Humans rely on the Sun and Earth’s systems for a habitable climate.</p> <p>Geographical location factors that affect climate include</p> <ul style="list-style-type: none"> • latitude • proximity to a large body of water • elevation • urban or rural setting <p>Changes in climate can be caused by natural processes, including</p> <ul style="list-style-type: none"> • volcanic eruptions • meteors • changes in the Sun’s output • changes in orbits <p>Changes in climate can be caused by human activities, including industrialization and pollution.</p> <p>The release of greenhouse gases into the atmosphere contributes to the warming of Earth.</p> <p>Clean energy production has the potential to reduce net greenhouse gas production.</p> <p>Personal actions that can help address human causes of global climate change include</p> <ul style="list-style-type: none"> • reducing personal consumption and waste 	<p>Complex interactions between humans, Earth’s systems, and the Sun can impact climate and climate change.</p> <p>Describe possible impacts on climate due to interactions between the Sun and Earth’s systems.</p> <p>Relate impacts of natural processes and human activities on climate change.</p> <p>Identify personal actions that may affect global climate change.</p>	

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	Grade 5			Grade 6		
				<ul style="list-style-type: none"> planting a garden or buying local produce using clean, affordable, and reliable energy sources responsibly 		
	<p>Tools to measure and track weather conditions include</p> <ul style="list-style-type: none"> thermometers wind vanes windsocks anemometers barometers rain or snow gauges hygrometers <p>Websites, weather maps, and weather apps provide access to weather information.</p> <p>First Nations, Métis, and Inuit communities rely on traditional knowledge, in addition to modern tools and methods, to interpret and predict weather patterns.</p> <p>Methods used to predict weather include</p> <ul style="list-style-type: none"> computer modelling historical data satellite imaging First Nations, Métis, and Inuit traditional knowledge 	<p>Weather conditions can be measured accurately using a variety of tools and methods.</p>	<p>Examine tools used to measure and track weather conditions.</p> <p>Construct simple tools to measure weather.</p> <p>Observe and record local weather for a given time interval.</p> <p>Represent local weather data.</p> <p>Construct a sample weather map of a local region for a given time.</p> <p>Explain the importance of weather forecasts.</p> <p>Investigate methods used to predict the weather.</p> <p>Discuss First Nations, Métis, and Inuit methods of predicting weather.</p>	<p>Climate change can affect</p> <ul style="list-style-type: none"> weather and extreme weather events migration patterns water resources frequency of forest fires <p>Climate change can impact agricultural practices, such as</p> <ul style="list-style-type: none"> crop selection crop production harvesting periods and yields irrigation pest management <p>Traditional ways of living off the land, including hunting and gathering practices of First Nations, Métis, and Inuit communities, have been impacted by climate change in various ways, such as</p> <ul style="list-style-type: none"> rising sea levels in coastal areas changing migration patterns access to hunting, harvesting, and fishing <p>Theories about potential causes of the extinction of dinosaurs include worldwide climate change, a catastrophic meteoric event, or volcanic activity.</p>	<p>Climate change over time can affect land, plants, humans, and other animals in a variety of ways.</p>	<p>Describe possible effects of climate change on land, plants, humans, and other animals.</p> <p>Discuss agricultural practices impacted by climate change.</p> <p>Research how climate change is affecting ways of living in northern, Inuit, and/or coastal communities in Canada.</p> <p>Discuss the effects of climate change on traditional ways of living off the land.</p> <p>Compare theories about dinosaur extinction.</p>

Science Kindergarten to Grade 6 Curriculum

	Grade 5			Grade 6		
	<p>Climate affects various aspects of human activity, including</p> <ul style="list-style-type: none"> • agriculture • infrastructure • clothing • transportation • recreation <p>Climate affects various aspects of animal activity, including</p> <ul style="list-style-type: none"> • migration patterns • accessing food • timing of reproduction 	Climate affects human and other animal activity.	Explain how climate can affect human and other animal activity.	<p>Climate change can be identified through long-term observation and measurement of weather conditions, including amount of precipitation, temperature, and number of extreme weather events.</p> <p>Climate change can be identified through long-term observation and measurement of environmental conditions, such as</p> <ul style="list-style-type: none"> • sea and ocean levels • thickness and duration of sea ice • permafrost changes • number of forest fires <p>Climate observations come from a variety of sources, such as</p> <ul style="list-style-type: none"> • recorded information • oral narratives • surface layers, including ice, from different time periods on Earth <p>Extreme weather events that occur on Earth include</p> <ul style="list-style-type: none"> • heatwaves • hurricanes • monsoons <p>Extreme weather events that occur in Canada include</p> <ul style="list-style-type: none"> • tornados • blizzards • torrential rain • wildfires <p>Technologies used to predict extreme weather events include radars, weather satellites, and computer modelling.</p>	Identifying changes in climate relies on observations and measurements from different points in time.	<p>Compare historical observations and measurements of weather and environmental conditions to current data.</p> <p>Relate extreme weather events to specific locations in Canada and on Earth.</p> <p>Identify and discuss technologies that are used to track and predict extreme weather events.</p>

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	Grade 5			Grade 6		
	<p>Climate and weather events may influence agricultural practices by affecting components such as</p> <ul style="list-style-type: none"> • crop type • crop production • animal population • soil quality • water access <p>Conservation agriculture is a sustainable practice that responds to local climate and weather events.</p> <p>Conservation agriculture practices are adapted to the requirements of plants and animals farmed.</p> <p>Agricultural practices involve monitoring and responding to climate or weather events such as</p> <ul style="list-style-type: none"> • drought • flooding • fires • windstorms <p>Conservation agriculture practices include</p> <ul style="list-style-type: none"> • minimizing soil disturbance • maintaining soil cover • using water efficiently • using sustainable harvesting practices <p>Sustainable harvesting practices support the maintenance of stable plant or animal populations over time and include</p> <ul style="list-style-type: none"> • crop rotation • companion planting • limiting hunting and trapping • considering future harvests 	<p>Climate and weather events influence agricultural practices.</p>	<p>Describe how climate may affect plants and animals farmed in Alberta.</p> <p>Discuss conservation agriculture practices and potential uses.</p> <p>Describe local climate and weather events that affect agricultural practices.</p> <p>Explain practices related to sustainable harvesting.</p>			

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	Observations of weather conditions and animal behaviour can be used to recognize patterns and cycles, such as seasonal migration.	Intergenerational observations and accounts of place enable individuals and communities to recognize patterns and cycles related to weather and seasons.	Examine how weather conditions and animal behaviour can be used to recognize weather patterns and cycles.	Traditional knowledge and modern technologies both provide information on long-term climate changes. Local Elders, traditional Knowledge Keepers, and scientists can collaborate and share information about local climate and climate change.	Collaboration contributes to a broader awareness of the effects of weather on people and environments.	Discuss how scientists, Elders, and traditional Knowledge Keepers can collaborate to develop deeper awareness of the effects of weather on people and environments. Propose ideas on how local Elders, traditional Knowledge Keepers, and scientists can collaborate to support awareness of local climate and climate change.

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Organizing Idea	Living Systems: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.					
Guiding Question	How are organisms supported by vital biological processes and systems?			In what ways are ecosystems complex?		
Learning Outcome	Students investigate the internal systems of organisms and explain how they support vital biological processes.			Students investigate the characteristics and components of and interactions within ecosystems.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Vital biological processes in complex organisms are carried out by biological systems that rely on each other.</p> <p>Vital biological processes of complex organisms include</p> <ul style="list-style-type: none"> • movement • nutrition • respiration • growth • reproduction <p>Humans and many other animals have internal biological systems that include the</p> <ul style="list-style-type: none"> • digestive system • respiratory system • circulatory system • musculoskeletal system <p>The digestive system breaks down food and absorbs nutrients, and includes the mouth, stomach, intestines, liver, and pancreas.</p> <p>The respiratory system exchanges oxygen and carbon dioxide, and includes the trachea, lungs, and diaphragm.</p> <p>The circulatory system moves blood around the body and includes the heart and blood vessels.</p> <p>The musculoskeletal system supports and moves the body, and includes muscles and bones.</p> <p>The digestive, respiratory, and circulatory systems work together to supply oxygen and nutrients to the human body.</p>	<p>Humans are complex organisms with biological systems that carry out vital biological processes.</p>	<p>Relate vital biological processes to a human or other animal's internal biological systems.</p> <p>Examine the function of the human digestive, respiratory, circulatory, and musculoskeletal systems.</p> <p>Identify the digestive, respiratory, circulatory, and musculoskeletal systems of the human body and the major body parts of each system.</p> <p>Investigate the relationships between body systems that are involved in moving oxygen and nutrients throughout the human body.</p>	<p>Ecosystems are complex systems of biotic and abiotic components.</p> <p>Biotic components of an ecosystem include plants, animals, and micro-organisms.</p> <p>Abiotic components of an ecosystem include</p> <ul style="list-style-type: none"> • energy from the Sun • water • soil • air • temperature <p>All components of an ecosystem influence each other either directly or indirectly; e.g.,</p> <ul style="list-style-type: none"> • animals rely on plants for food • plants need water to grow • energy from the Sun affects temperature • decomposers help return nutrients to the soil <p>There are many types of ecosystems, such as</p> <ul style="list-style-type: none"> • desert • arctic • grassland • wetland • forest • freshwater <p>Characteristics of ecosystems include</p> <ul style="list-style-type: none"> • climate patterns • size • vegetation structure • animal populations • geographic location <p>Some ecosystems store greenhouse gases and prevent</p>	<p>The components and characteristics of an ecosystem affect the diversity of the organisms that live in it.</p>	<p>Represent and connect the biotic and abiotic components of an ecosystem.</p> <p>Locate and responsibly examine a local ecosystem in nature using appropriate materials and tools.</p> <p>Relate the preservation of various ecosystems to possible actions that address climate change.</p> <p>Create a model or simulation to represent a chosen ecosystem and its characteristics.</p> <p>Compare the characteristics of two ecosystems.</p> <p>Examine the diversity of animals and plants in various ecosystems in relation to abiotic components.</p>

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				<p>them from being released into the atmosphere, such as</p> <ul style="list-style-type: none"> • wetlands • oceans • forest • grasslands <p>Ecosystems can be examined using digital or non-digital tools, such as still-image and video cameras and magnifying devices.</p> <p>Characteristics of ecosystems that affect diversity of organisms include</p> <ul style="list-style-type: none"> • geographic location, including climate patterns, landforms, and water sources • size, from very small to very large • complexity, including number and types of plants and animals 		
	<p>Plant transport systems include xylem and phloem.</p> <p>Xylem and phloem in plants perform similar functions to the circulatory system in animals.</p> <p>Xylem transports water and nutrients from the roots to the rest of the plant.</p> <p>Phloem transports sugars from the leaves to the rest of the plant.</p>	<p>Plants are complex organisms with transport systems that carry out specific functions for survival.</p>	<p>Examine the transport systems of plants and describe their functions.</p>	<p>Plants carry out the process of photosynthesis, which uses light, water, and carbon dioxide to produce oxygen and food in the form of sugar (glucose).</p> <p>Plants and animals use food produced during photosynthesis to perform vital biological processes.</p> <p>Plants and animals use the oxygen that is released during photosynthesis for respiration.</p> <p>Chlorophyll in plants collects light needed for photosynthesis.</p> <p>The release of oxygen and the presence of starch indicate that a plant has been photosynthesizing.</p> <p>Sugar produced by plants through photosynthesis is often stored as starch.</p>	<p>Photosynthesis is a process that supports growth and survival in a variety of ecosystems.</p>	<p>Explain the process of photosynthesis and its importance in an ecosystem.</p> <p>Design and perform a controlled experiment to demonstrate the importance of light to photosynthesis.</p> <p>Design and perform a controlled experiment to show that a plant is releasing oxygen.</p> <p>Design and perform a controlled experiment to show that a plant contains starch.</p>

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				<p>Plants play a variety of roles in an ecosystem, such as</p> <ul style="list-style-type: none"> • photosynthesizing • cleaning and filtering water • reducing soil erosion • providing food and shelter for animals <p>Humans, like all animals, depend on plants to produce oxygen that is used for respiration.</p> <p>Humans also rely on plants in various other ways, such as</p> <ul style="list-style-type: none"> • food • clothing • paper • building materials • medicine • fuel <p>Plants benefit from animals, including humans, to help provide carbon dioxide, which they need to survive.</p> <p>Certain plants are considered sacred to First Nations and Métis, such as</p> <ul style="list-style-type: none"> • sage • sweetgrass • cedar • tobacco <p>The offering of tobacco signifies</p> <ul style="list-style-type: none"> • balance and harmony • giving back to the land • respect for the plant • a sustainable relationship 	<p>There are significant relationships between plants and animals within ecosystems.</p>	<p>Examine ways that plants and animals rely on each other to meet their needs.</p> <p>Discuss plants that are considered sacred to First Nations and Métis.</p>

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	Grade 5			Grade 6		
Organizing Idea	Space: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.					
Guiding Question	How are astronomical phenomena observed and interpreted?			In what ways can the solar system be explored?		
Learning Outcome	Students investigate and interpret astronomical phenomena.			Students analyze and represent celestial bodies of the solar system.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Astronomical phenomena are observable events that happen among objects in space.</p> <p>Astronomical phenomena include</p> <ul style="list-style-type: none"> • seasons • Moon phases • lunar and solar eclipses • equinoxes and solstices • length of day and night • auroras <p>Astronomical phenomena, such as Moon phases, can have predictable patterns and cycles.</p> <p>Seasons are experienced during different times of the year in the northern and southern hemispheres of Earth because these regions are tilted toward the Sun at different times of the year.</p> <p>Longer and shorter days are experienced during different times of the year in the northern and southern hemispheres of Earth because these regions are tilted toward the Sun at different times of the year.</p> <p>In the northern hemisphere, auroras are referred to as the northern lights (aurora borealis).</p> <p>First Nations, Métis, and Inuit ways of living and significant events are connected to many astronomical phenomena, such as the association of seasons to ceremonies.</p> <p>Astronomical phenomena can be represented in various ways that</p>	<p>Observations and interpretations of astronomical phenomena can inform daily living.</p>	<p>Connect the direction of Earth's tilt in relation to the Sun to the length of day and night in each season.</p> <p>Describe personal observations related to cyclical changes in the Moon's appearance.</p> <p>Discuss observable features of lunar and solar eclipses and auroras.</p> <p>Identify astronomical phenomena that occur cyclically.</p> <p>Explore First Nations, Métis, and Inuit understandings of phases and cycles within astronomical phenomena that inform ways of living and community activities.</p> <p>Explore Inuit, northern First Nations', or Métis' stories related to the midnight sun, the polar night, or the northern lights.</p> <p>Represent astronomical phenomena in a variety of ways.</p> <p>Explore Indigenous representations of astronomical phenomena, past and present.</p> <p>Identify how observation of astronomical phenomena can determine agricultural and hunting practices.</p>	<p>Scientific exploration of space has revealed that Earth is an interconnected part of a group of planets that orbit the Sun.</p> <p>The solar system is a complex group of celestial bodies that include</p> <ul style="list-style-type: none"> • the Sun (a star) • planets and their moons • dwarf planets • asteroids • comets • meteoroids <p>Celestial bodies are natural bodies located beyond Earth's atmosphere.</p> <p>Celestial bodies have characteristics that vary in many ways, including</p> <ul style="list-style-type: none"> • surface conditions; e.g., temperature, gravity, and atmosphere • composition; e.g., gas, ice, or visible rings • size • shape; e.g., round or irregular <p>Some celestial bodies emit light and others reflect light.</p> <p>An asteroid belt is a collection of asteroids found within the solar system.</p> <p>Although Pluto was originally classified as a planet, new information led to the reclassification of Pluto as a dwarf planet.</p> <p>The solar system can be modelled</p>	<p>Information about Earth can be acquired through exploration of the solar system.</p> <p>Name and order the planets in the solar system and identify the location of the main asteroid belt.</p> <p>Classify celestial bodies of the solar system as planets, moons, dwarf planets, asteroids, comets, meteoroids, or the Sun.</p> <p>Represent and describe the characteristics of celestial bodies in our solar system.</p> <p>Examine celestial bodies that emit or reflect light.</p> <p>Discuss the reclassification of Pluto.</p> <p>Interpret physical, pictorial, or digital models of the solar system.</p> <p>Investigate digital or non-digital resources that contribute to understandings of the solar system.</p>	

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	<p>connect to daily life, including</p> <ul style="list-style-type: none"> • calendars • cycles • stories and legends • artifacts • models and digital simulations <p>Observations and interpretations of astronomical phenomena can be applied in various contexts, including</p> <ul style="list-style-type: none"> • planting and harvesting crops • hunting 			<p>to represent the size of the Sun and the planets and the distance between them.</p>		
				<p>Technologies that are used to explore the solar system include</p> <ul style="list-style-type: none"> • telescopes • satellites • probes • rovers • manned spacecraft and space stations • computer modelling <p>Satellites are objects in space that orbit around another larger object.</p> <p>An orbit is the recurring path of an object around another object in space.</p> <p>Natural satellites are celestial bodies.</p> <p>Artificial satellites are constructed and put into orbit by humans.</p> <p>The first satellite put into orbit by Alberta (Ex-Alta 1) was designed by a group of students and faculty at the University of Alberta (AlbertaSat) and was successfully launched from the International Space Station in 2017.</p> <p>The International Space Station is a research facility that orbits Earth.</p>	<p>Knowledge of the solar system continues to develop with further space exploration, discovery, and use of technologies.</p>	<p>Identify and compare technologies used to gather knowledge about planets and other objects in space.</p> <p>Compare and contrast natural satellites and artificial satellites.</p> <p>Discuss potential personal, societal, technological, and environmental barriers to living and working in space.</p>

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	Grade 5			Grade 6		
Organizing Idea	Computer Science: Problem solving and scientific inquiry are developed through the knowledgeable application of creativity, design, and computational thinking.					
Guiding Question	In what ways can design be used to help achieve desired outcomes or purposes?			In what ways are abstraction, design, and coding related?		
Learning Outcome	Students apply design processes when creating artifacts that can be used by a human or machine to address a need.			Students examine abstraction in relation to design and coding, and describe impacts of technologies.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>A computational artifact is anything created by a human using a computer, such as</p> <ul style="list-style-type: none"> • computer programs and code • images • audio • video • presentations • web pages <p>Design can be used to create algorithms and translate them into code.</p> <p>Code is any language that can be understood by and run on a computer.</p> <p>There are many ways to code, including using visual block-based languages.</p> <p>Visual block-based languages are a form of code in which prepared chunks of instructions are in drag-and-drop blocks that fit together like puzzle pieces to design a program.</p> <p>A computer cannot think for itself and must rely on code for all that it does.</p> <p>A loop is a repetition of instructions used in an algorithm.</p>	<p>Design can be used by humans or machines to meet needs.</p>	<p>Engage in the design process to create computational artifacts.</p> <p>Relate a block of code to an outcome or a behaviour.</p> <p>Explain what will happen when single or multiple blocks of code are executed.</p> <p>Translate a given algorithm to code using a visual block-based language.</p> <p>Design an algorithm that includes a loop and translate it into code.</p>	<p>The process of abstraction includes</p> <ul style="list-style-type: none"> • determining what details to keep and what to ignore • removing unnecessary details • identifying important information • generalizing patterns <p>Information is data that is organized to be more useful.</p> <p>An abstraction is a simplified version of something complex.</p> <p>Abstractions can make daily life easier; e.g.,</p> <ul style="list-style-type: none"> • simple controls on appliances • light switches • steering wheels • apps <p>Computational artifacts can be designed to address societal needs and wants; e.g.,</p> <ul style="list-style-type: none"> • weather modelling • communications • automotive controls • medical research • apps <p>Structures used in coding include</p> <ul style="list-style-type: none"> • sequences • conditionals (if-then-else statements) • loops <p>Sequence structures are ordered sets of instructions within code.</p> <p>Conditional structures are statements that tell computers to complete different actions based on different situations.</p>	<p>Abstraction is used in design and coding of computational artifacts to make problems easier to think about.</p>	<p>Apply abstraction during the design process.</p> <p>Identify examples of abstractions encountered in daily life.</p> <p>Discuss the role of design and coding in society.</p> <p>Use a visual block-based language to design code that includes relevant design structures.</p>

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	<p>Design process can be influenced by various factors, including</p> <ul style="list-style-type: none"> • safety • functionality • usability • reliability • efficiency • aesthetics <p>Functionality is the quality of being useful to do the job for which something was designed.</p> <p>Usability is the degree of ease with which something can be used to achieve an outcome.</p> <p>Design processes that support the development of multiple iterations include</p> <ul style="list-style-type: none"> • enhancing • refining <p>Design can be improved through collaboration.</p>	<p>Design can better meet needs through the development of multiple iterations.</p>	<p>Discuss examples of designs that have been enhanced or refined to better meet needs.</p> <p>Evaluate an artifact based on various factors.</p> <p>Design an artifact to meet a need.</p> <p>Propose enhancements and refinements to an artifact in collaboration with others.</p> <p>Develop multiple iterations of an artifact.</p>	<p>The use of computers, coding, and technology can have impacts that are</p> <ul style="list-style-type: none"> • personal • social • environmental • economic <p>Impacts of computers, coding, or technology may be intentional or unintentional.</p>	<p>Computers, coding, and technology can be used in ways that have positive or negative impacts.</p>	<p>Discuss how computers, coding, or technology have had impacts.</p> <p>Predict possible impacts of computers, coding, or technology.</p>

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	Grade 5			Grade 6		
Organizing Idea	Scientific Methods: Investigation of the physical world is enhanced through the use of scientific methods that attempt to remove human biases and increase objectivity.					
Guiding Question	How does evidence lead to understanding?			What is the purpose of scientific explanations?		
Learning Outcome	Students investigate how evidence is gathered and explain the importance of ethics in science.			Students investigate and describe the role of explanation in science.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	<p>Phenomena are facts or events that can be observed.</p> <p>Some phenomena can be directly observed using the human senses.</p> <p>Phenomena that cannot be directly observed using the human senses can be observed and measured using technologies such as telescopes, microscopes, and X-rays.</p> <p>Natural phenomena occur without human input, such as lightning and auroras.</p>	<p>Investigations can be conducted to better understand phenomena.</p>	<p>Discuss technologies that provide scientists with evidence that cannot be directly observed using the human senses.</p>	<p>Scientific explanations make sense of natural phenomena based on an investigation.</p> <p>Scientific explanations must be testable (falsifiable) by an investigation that will either support or contradict the explanation.</p> <p>Hypotheses are proposed scientific explanations developed prior to conducting an investigation.</p> <p>Hypotheses are based on prior scientific knowledge and understandings.</p>	<p>Explanations are used in science to answer scientific questions.</p>	<p>Discuss the role of scientific explanations.</p> <p>Develop and test a hypothesis based on a scientific explanation.</p>
	<p>Bias is any personal thoughts, feelings, or expectations that influence an investigation.</p> <p>Humans are not usually aware of their personal biases.</p>	<p>Evidence is more reliable and valid when investigations are conducted in a way that limits bias.</p>	<p>Identify biases that could influence an investigation.</p>	<p>Evidence is used to support or contradict a hypothesis.</p> <p>Scientific explanations can be used to describe natural phenomena such as phases of the moon, hours of daylight, and amount of rain or snowfall (precipitation).</p> <p>Scientific experiments performed with objectivity and a high level of accuracy produce trustworthy evidence to support explanations.</p>	<p>Scientific explanations are constructed using reliable, objective data and evidence.</p>	<p>Create scientific explanations for how natural phenomena occur.</p> <p>Discuss observations and measurements used to create scientific explanations.</p> <p>Evaluate the trustworthiness of evidence and explanations from a variety of sources.</p>

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	<p>A variable is a condition or factor that can influence the outcome of an experiment.</p> <p>A manipulated or independent variable is changed to determine what effect the change will have on the responding variable in a controlled experiment.</p> <p>A responding or dependent variable changes as a result of changes to the manipulated variable in a controlled experiment.</p> <p>A controlled variable is kept the same in a controlled experiment.</p> <p>A controlled experiment is an investigation in which one variable is changed and all other variables are kept the same.</p>	<p>Evidence from a controlled experiment can be used to make conclusions about cause-and-effect relationships between variables.</p>	<p>Plan and conduct a controlled experiment.</p> <p>Identify the variables in a controlled experiment.</p> <p>Apply vocabulary for variables correctly in science contexts.</p> <p>Evaluate the effect of the manipulated variable on the responding variable in a controlled experiment.</p> <p>Defend a conclusion about cause and effect based on evidence produced in a controlled experiment.</p>	<p>First Nations, Métis, and Inuit share explanations of natural phenomena through</p> <ul style="list-style-type: none"> • written texts • traditional knowledge • visual forms • verbal presentations • stories and legends <p>Scientific explanations can incorporate a variety of texts, such as</p> <ul style="list-style-type: none"> • visual forms; e.g., graphs, tables, flow charts, diagrams, and models • written texts; e.g., research papers • verbal presentations; e.g., stories and discussions <p>A scientific explanation can be communicated in different ways depending on audience.</p> <p>The needs of the audience influence how science is communicated, such as</p> <ul style="list-style-type: none"> • vocabulary used • level of detail • method of communication 	<p>Explanations of natural phenomena are communicated in various ways.</p>	<p>Interpret multiple forms of text that offer explanations of natural phenomena.</p> <p>Communicate explanations using appropriate digital or non-digital technologies.</p> <p>Construct digital or non-digital graphs and tables using proper labels, legends, scales, and titles.</p> <p>Determine the appropriateness of methods of communicating explanations based on the audience.</p>

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	<p>Representations of data can include all or some of the data.</p> <p>Diverse representations of data can communicate evidence differently.</p> <p>Evidence that is communicated clearly and accurately</p> <ul style="list-style-type: none"> • uses correct vocabulary • includes all relevant data • is free from personal bias • can be understood by the intended audience <p>Evidence that is not communicated clearly and accurately can influence the validity and reliability of the investigation.</p>	<p>Evidence must be communicated clearly and accurately.</p>	<p>Discuss the use of diverse representations of data in communicating evidence.</p> <p>Compare the clarity and accuracy of evidence communicated by diverse representations of data.</p> <p>Discuss potential impacts of evidence that is not communicated clearly and accurately.</p>	<p>Evidence and scientific explanations are subject to further investigation to determine their validity.</p> <p>Further investigation can involve a variety of processes, such as</p> <ul style="list-style-type: none"> • continual collection of evidence over time • discussion and debate in the scientific community • conducting multiple investigations over long periods of time • using new technologies and methods that reveal new evidence <p>New evidence has refined inaccurate scientific explanations of natural phenomena, such as</p> <ul style="list-style-type: none"> • the Sun revolves around the Earth • different tastes are detected in different areas of the tongue • the eyes are a source of light, allowing vision <p>One conflicting study is not enough to cause a scientific explanation to be refined.</p>	<p>Science is a self-correcting way of knowing about the world, where new evidence can change understandings and explanations.</p>	<p>Discuss processes that can be used to validate evidence and explanations.</p> <p>Identify explanations of natural phenomena that have been refined as new evidence has been revealed.</p>
	<p>Scientific ethics are principles and rules that guide behaviour when conducting scientific investigations.</p> <p>Scientific ethics are demonstrated during investigations in ways such as</p> <ul style="list-style-type: none"> • not changing data in an experiment • minimizing harm to environments, humans, and other animals • respecting the privacy of participants • limiting personal bias 	<p>Evidence needs to be produced, handled, and shared ethically.</p>	<p>Examine the importance of scientific ethics in investigations.</p> <p>Demonstrate scientific ethics during investigations.</p>			