Draft Science Kindergarten to Grade 6 Curriculum

	Kindergarten			Grade 1			Grade 2		
Organizing Idea	Matter: Understandings of the physical world are deepened through 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?		
Learning Outcome	Children examine properties of natural or constructed objects.			Students analyze properties of natural and constructed objects and investigate how they can be changed.			Students investigate the properties of materials and relate them to a purpose.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	An object is anything that can be perceived using senses. Properties of objects include • colour • size • shape • texture	Properties are distinctive characteristics of natural and constructed objects. Properties can be identified and described.	Discuss how objects can be similar in some ways but different in others.	Objects take up space and have mass. Measurable properties of objects include • size • length • area • mass Properties can be identified and described.	Properties are distinctive characteristics of natural and constructed objects.	Ask questions about objects and identify properties. Describe the properties of objects using words or numbers.	Materials are substances used to form objects.	Materials can be combined in a variety of ways to build an object.	Identify the materials used to make various objects. Diagram the steps taken to create an object for a specific purpose. Combine materials to create an object for a specific purpose.
	The five senses are • sight (eyes) • touch (skin) • hearing (ears) • smell (nose) • taste (tongue) Senses can be used to determine properties. Properties determined by the sense of sight can include • colour • size • shape • texture Properties determined by the sense of touch or by holding can include • texture • shape • temperature • weight Properties determined by the sense of hearing can include sound.	Properties of natural and constructed objects can be explored through the five senses.	Describe the properties of objects using a specific sense. Use accurate vocabulary when describing properties.	Tools used to examine properties of objects and materials can include balance scales and magnifying glasses.	Properties of objects can be safely examined using various tools.	Directly compare the properties of size, length, area, and mass of various objects. Use various tools safely when investigating objects.	Properties of materials that can be compared include • transparency • absorption of water • malleability • reflection • length • mass	Materials have properties that can be observed, described, tested, and/or measured.	Test properties of various natural and processed materials. Measure the length and mass of various objects using non-standard measurement.

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	Properties determined by the sense of smell can include scent. Tastes can include • sweet • sour • bitter • salty • umami (savory)								
	Properties that can be used to sort, categorize, or order objects include • colour • size • shape • texture	Objects may be sorted, categorized, or ordered based on their properties.	Describe properties of various objects. Sort various objects by properties. Experiment with the properties of shape and size by building structures using various objects.	Physical properties that have the ability to be changed can include • size • length • shape • texture	Some physical properties of objects can be changed.	Observe and describe a variety of physical changes in objects. Experiment with changing physical properties of objects.	Natural materials are those that come from plants, animals, or the ground. Processed materials are made by humans.	Materials are natural or processed. All processed materials must be derived from natural materials.	Sort various materials as natural or processed.
	Two objects may be the same size yet one may be heavier or lighter than the other.	Objects may be similar in one or more properties yet be different in another property.	Compare and contrast objects that have common or similar properties.	Actions that change the physical properties of an object, but do not alter its composition, can include • bending • twisting • stretching • cutting • breaking Not all objects respond the same way to bending, twisting, stretching, cutting, or breaking.	The composition of an object remains the same when it undergoes physical changes.	Predict how physical properties can be changed through bending, twisting, stretching, cutting, or breaking. Explain why bending, twisting, stretching, cutting, or breaking does not affect the composition of an object.	The same kind of object can be made from different materials. Objects created from natural materials by First Nations, Métis, and Inuit can include • Dene birchbark baskets • Métis travois • canoes • Inuit scraping tools such as an ulu	Natural and processed materials are used to make a variety of objects that serve a variety of purposes.	Identify natural and processed materials that could be used for a specific purpose. Identify a common object or structure that can be made from different materials. Identify natural materials used by local First Nations, Métis, or Inuit and relate their use to a specific purpose.
							Knowledge of the properties of materials and their purpose is important in many occupations, including • carpenter • builder • tailor • engineer • designer • architect	The purpose of an object influences the choice of materials used to produce it. Some materials are more suitable than others for making a product.	Compare the properties of materials, natural and/or processed, to determine what material is best for a specific purpose. Explain the relationship between suitability of materials and purpose.

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							First Nations, Métis, and Inuit use of materials is informed by • traditional knowledge • time of year • availability of materials • practices of sustainability		Select a material and use it to create an item for a specific purpose. Discuss choice of material based on availability and sustainability.

	Kindergarten			Grade 1			Grade 2		
Organizing Idea	Energy: Understandings of the physical world are deepened through investigating matter and energy.								
Guiding Question	How can humans, animals, and objects move?			How can movement of objects be understood?			Where do light and sound come from and how do they move?		
Learning Outcome	Children explore movement of humans, animals, and objects.			Students investigate the direction, pathway, and speed of moving objects.			Students investigate the source, pathway, and behaviour of light and sound.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Objects move in various ways, including • straight line • curve • circle • back and forth • zigzag • up and down • fast and slow	Movement is a change in an object's position that happens over time.	Observe and describe movement of objects using appropriate vocabulary. Describe objects that move. Describe objects that do not move.	Aspects of movement that can be observed and described include direction, pathway, and speed.	Movement of objects can be observed and described.	Observe and describe the movement of objects.	Sources of light include • the Sun • electricity • fire • living organisms (bioluminescence) Sources of sound include anything that produces sound vibrations, such as • musical instruments • speakers and headphones • vocal cords of humans and animals • objects hitting each other	The sources of light and sound can be identified.	Identify sources of light and sound.
	Movement of humans, animals, and objects can include • flying • crawling • hopping • swimming • jumping • climbing • dancing • sliding • walking • running Most humans and animals are capable of moving themselves.	Humans, animals, and objects move in various ways.	Observe and imitate how animals move. Identify, using appropriate vocabulary, how animals and humans move.	Directions of movement can include • up • down • forward • backward • sideways • toward • away from	Movement occurs in different directions and can occur over different distances.	Describe the direction of movement using appropriate vocabulary.	Volume, duration, and pitch are characteristics of sound. Sound is caused by vibrations of objects and air. Vibration is a rapid back-and-forth movement.	Sound is produced by an interaction between objects or substances that causes vibration. Change in the rate of vibration can alter pitch.	Explain how a change in vibration results in a change in sound.

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	Reasons for human and animal movement include • seeking food and water • exercise and play • escaping danger • survival • following the seasons	Humans and animals move for several reasons.	Examine the reasons that animals and humans move.	Movement pathways can be • straight • curved • spiral • side-to-side	A movement pathway is the path an object or animal follows when it moves. Movement pathways can vary.	Observe, describe, and record the movement of objects along different pathways.	Characteristics of materials that affect the production of sound vibration can include • size • texture • shape • type	Vibrations can produce different sounds depending on characteristics of materials.	Experiment with the production of sound using various materials or substances. Test a variety of materials that can produce vibrations.
				Speed can be • constant • changing • stopped • fast • slow	Movement occurs at different speeds.	Describe the speed of movement using appropriate vocabulary.	Sound vibration travels through a variety of materials, including air, water, and solid materials. Sound vibration travels in all directions and reflects off different surfaces. Characteristics of materials that may amplify or muffle sound vibrations include • size • texture • shape • type	Movement, including sound vibration, can be transferred from one object to another. Sound vibrations can be amplified or muffled by the characteristics of materials they come into contact with.	Build a simple device to amplify or muffle sound.
				Objects can move in different ways, including • rolling • bouncing • swinging • flying • gliding • sliding	Movement of objects occurs in a variety of ways.	Perform trials to determine how objects move.	Light can move in various ways, including • in a straight line from its source • through bouncing off a surface (reflection) • through bending as it travels from one material to another (refraction) • through splitting into colours (dispersion) Some objects allow light to move straight through them (transparent).	Objects can affect the movement path of light.	Perform simple experiments to determine how the movement path of light is affected by a variety of materials.

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							Objects that affect the movement path of light can include mirrors, water, and prisms.		
				Factors that influence movement of objects include • shape • materials • surface • pathway • interactions with other objects Wheels can make things easier to move.	Movement of objects is influenced by a variety of factors.	Demonstrate how the movement of objects can be influenced.			

	Kindergarten			Grade 1			Grade 2		
Organizing Idea	Earth Systems: Understandings of the living world, Earth, and space are deepened through investigating natural systems and their interactions.								
Guiding Question	What makes up my environment?			In what ways are elements of the environment interrelated?			What is important about our planet, Earth?		
Learning Outcome	Children examine and describe the surrounding environment.			Students analyze the environment and explain how its elements interact and change.			Students investigate Earth, its landforms, bodies of water, and relationship to the Sun.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Environments can be experienced using sight, hearing, smell, and touch. Environments can include plants, animals, and humans. Environments can include human-made structures such as buildings and roads. Environments can include land, water, and air. Environments can range in size.	Environment refers to physical surroundings. Environments can be explored, observed, and wondered about.	Use senses to make observations about environments. Ask questions about the surrounding environment.	The four seasons in Alberta include • summer • autumn • winter • spring Some places have two seasons, rainy and dry.	Changes in the environment include seasonal changes.	Observe seasonal changes in the environment. Observe the same local environments over time. Monitor and document signs of seasonal change over time. Share personal experiences with seasons.	Components of Earth include • land • water • air • plants, animals, and humans At this time, Earth is the only planet known to support life. Scientists are looking for life on other planets and moons.	Earth consists of many components that support life.	Identify and represent various components of Earth. Discuss how the various components of Earth interact to support life.
	Objects in the environment can be natural or constructed by humans.	Environment is a shared space where objects are found.	Identify objects found in nature and those constructed by humans within the local environment.	Seasonal changes in the appearance of the environment can include • snow covering the ground • snow melting • the surface of lakes and other bodies of water freezing • the frozen surface of lakes and other bodies of water breaking up • river flow • water levels in rivers and lakes Seasonal changes in the appearance of plants and animals can include • camouflage in animals	Seasonal changes are related to the appearance of the environment. Seasonal changes in an environment are related to the appearance of the plants and animals that inhabit it.	Relate the changes in appearance of plants and animals to the seasons. Relate the changes in appearance of an environment to the seasons. Relate the seasonal changes of appearance in an environment to the seasonal changes of appearance in plants and animals. Draw an environment in different seasons to show the ways the environment changes.	A landform is a natural feature of the Earth's surface. Landforms in Alberta include • plateaus • plains • mountains • valleys • hills • foothills • canyons • prairies	Earth's surface consists of various types of landforms.	Identify landforms that are local or within the province. Apply appropriate vocabulary when describing landforms.

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				• leaves changing colour and falling • flowers blooming • crops and plants greening and growing • crops and plants ready for harvest					
	Environmental changes can include day, night, and weather.	Changes can be observed in the environment.	Observe a variety of local environments over time. Record observations of changes in the environment.	Migration is the regular, usually seasonal, movement of an animal population to and from a given area. Hibernation is a deep sleep that helps animals to save energy and survive the winter without eating much. Animals that hibernate in winter include bears, squirrels, and bats. Animals that migrate include • whales • geese • polar bears • butterflies • caribou	Seasonal changes can affect the behaviour of animals, including migration and hibernation.	Investigate animal behaviour throughout the seasons, including migration and hibernation.	Reasons for feeling a connection to a place or landform can include that its name • is in one's first language • describes characteristics • reflects history or significance • has special personal meaning • is significant to personal background	Names of places and landforms can hold meaning. Names of places and landforms can be descriptive or observational. Names of places and landforms in an environment can lead to feelings of connection.	Explain personal connections to names of places and landforms. Identify local landforms and bodies of water in local Indigenous language.
	Components of natural environments can include • plants • animals • humans • land • water • air	Natural environments consist of many different components.	Represent a local natural environment.	Seasonal changes may affect clothing choices, recreational activities, and transportation.	Understanding seasonal changes in the environment can help people make decisions about daily activities.	Describe how seasonal changes affect decisions about daily activities.	Landforms that may hold many names can include mountains, rivers, and lakes. Names for places and landforms may be connected to cultural • relevance • practices • stories • songs In Stoney language, Calgary is Wichispa Oyande, which translated means "elbow town."	There may be many names for the same specific landform in an environment.	Discuss the origin of different names for the same landform in a local environment or in Alberta. Discuss the meaning of traditional Indigenous place names, including those for Calgary and Edmonton.

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							In Cree language, Edmonton is amiskwaciy-wâskahikan, which translated means “beaver hill house.”		
	Ways to protect the environment include • reducing waste • reusing • recycling • not littering	Components of the environment are important and should be cared for and treated with respect.	Discuss the importance of caring for and treating the environment with respect. Demonstrate respect and care while interacting with the environment. Identify a way to protect the environment.	Sudden changes in the environment can include • storms • floods • fires • wind changes • temperature changes	Environments can undergo sudden changes.	Share personal experiences related to sudden changes in the environment.	Characteristics of a landform include slope, size, or terrain. Slope is the length and gradient of the land. Sloped landforms can include • valleys • glaciers • slides • badlands • mountains Terrain refers to the features of the surface of a piece of land. Terrain can be described as • hilly • rocky • tundra • forest	Landforms on Earth have varying characteristics.	Compare various landforms on Earth’s surface.
	Physical locations, objects, and experiences can foster connections to natural environments. Ways First Nations, Métis, and Inuit communities connect with nature can include • hunting • gathering • trapping • fishing • ceremonies • cultural traditions	Natural environments can lead to feelings of connection as people appreciate and see beauty in them. For First Nations, Métis, and Inuit, ways of living are related to the land.	Identify natural environments that lead to personal feelings of connection. Reflect on what is personally considered to be beautiful in natural environments. Discuss connections First Nations, Métis, or Inuit have with nature.	The five senses are • sight (eyes) • touch (skin) • hearing (ears) • smell (nose) • taste (tongue)	Environments are observed and understood using senses.	Share personal observations of the environment. Describe various environments, drawing from information gathered through the senses.	Bodies of water on Earth’s surface include • oceans • glaciers • lakes • wetlands • rivers Bodies of water in Alberta include • glaciers • lakes • wetlands • rivers	Earth’s surface is mostly covered by bodies of water.	Research and identify local and provincial bodies of water. Diagram steps demonstrating how water flows from small creeks to the ocean. Create a model to represent various types of landforms and bodies of water.

	Kindergarten			Grade 1			Grade 2		
							Water flows downhill from smaller bodies of water to larger bodies of water in the following ways: • 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 • larger rivers merging into major waterways such as oceans		
				The responsibility to care for the environment is fulfilled by showing respect for and protecting all aspects of nature. The sense of responsibility of many First Nations, Métis, and Inuit can be connected to place, traditional knowledge, and practices for future generations.	A sense of responsibility toward nature can promote care for the environment and conservation.	Discuss benefits of spending time in natural environments. Identify personal and group actions that help care for the local environment. Discuss and reflect on First Nations, Métis, and Inuit community actions that illustrate a responsibility to care for the natural world.	Freshwater bodies can include • glaciers • most lakes • wetlands • rivers Saltwater bodies can include oceans and seas.	Water found on Earth can be either fresh or salt water.	Identify bodies of water on Earth that contain salt water and fresh water.
							Earth’s revolution around the Sun takes a year. Earth’s rotation on its axis takes a day.	Earth rotates on an axis and revolves around the Sun.	Describe the relationship between Earth and the Sun. Represent ways that Earth’s rotation connects to patterns of day and night.

	Kindergarten			Grade 1			Grade 2		
Organizing Idea	Living Systems: Understandings of the living world, Earth, and space are deepened through 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 plants and animals and examine their needs.			Students investigate the growth and development of plants and animals and consider their relationship to humans.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
				Plants are living things that can grow, can make their own food, and usually cannot move from place to place. Animals are living things that can grow, need to find food, and are usually able to move from place to place. Plants and animals exist in all shapes and sizes. Science classifies humans as animals.	Plants and animals are living things.	List examples of plants and animals native to Alberta and Canada. Observe and describe similarities and differences between plants and animals.	Human behaviour that can positively affect plants and animals includes • reducing, reusing, recycling, and repurposing • recovering natural areas • protecting and not disrupting natural spaces • creating natural areas and parks Human behaviour that can negatively affect plants and animals includes • littering • polluting • depleting resources plants and animals need to live • introducing plants and animals that are not native to the area	Plants and animals can be affected by human behaviour.	Discuss the importance of caring for and treating plants and animals in the environment with respect. Demonstrate respect and care while interacting with plants and animals in various environments. Explain the positive and negative impacts of human behaviour on plants and animals.
				Basic needs of plants and animals include • food • water • air • shelter	Plants and animals require an environment that allows them to meet their needs.	Represent plants and animals in local and other environments. Explain how an environment meets the basic needs of plants and animals. Discuss the different ways local animals travel from place to place to meet their needs.	Plants' or animals' children are called offspring.	Plants and animals have similar characteristics to their parents.	Identify similarities between offspring and their parents.

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						Describe personal experiences of how people take care of their plants and pets.			
				Ways that plants and animals or their parts can be used include • food • clothing • shelter • tools • art • medicine • social/emotional connection	People use plants and animals to meet their needs and wants.	Discuss how people from various cultures use plants and animals to meet their basic needs. Identify products made by various cultures that use plant and animal parts, including from local First Nations, Métis, or Inuit.	Ways to represent life cycles can include • illustrations • diagrams • models • stories	Plants and animals have observable patterns or stages in their development that can be represented by life cycles.	Represent the life cycles of various plants and animals. Compare life cycles of various plants and animals. Discuss observations about life cycles of various plants and animals.
							Some First Nations, Métis, and Inuit have perspectives that consider plants and animals to be equal to human beings.	People have various perspectives about the roles of plants and animals. Some First Nations, Métis, and Inuit practise taking only what is needed from the land, which can demonstrate care and consideration for the land and those around us.	Identify ways of understanding and relating with plants and animals. Discuss how taking only what is needed from the land reduces waste and limits negative impacts on the environment, plants, and animals.

	Kindergarten			Grade 1			Grade 2		
Organizing Idea	Computer Science: Problem solving and scientific inquiry are developed through the knowledgeable application of creativity, design, and computational thinking.								
Guiding Question	What are instructions?			How can we follow and create instructions?			How can creativity be used to ensure that instructions lead to the desired outcome?		
Learning Outcome	Children interpret instructions in the learning environment.			Students investigate instructions and their influence on actions and outcomes.			Students apply creativity when designing instructions to achieve a desired outcome.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Instructions are directions that can be followed.	Following instructions can help people be safe, complete a task, and know what to do.	Recognize when actions do not correspond to instructions. Match an action to the corresponding instruction.	Instructions take many forms, including verbal, visual, and written.	The same instructions can be given in different forms.	Follow instructions with two or three steps given in different forms. Determine if the outcome of instructions given in different forms is the same or different.	Creativity is the ability to create something new or original. Creativity can be used to design instructions for • games • sports • science experiments • recipes • computer programs	Instructions are designed using creativity.	Consider how creativity is used when designing instructions for games, sports, or science experiments. Recognize and discuss how creativity can help generate new ideas, technology, tools, or products.
	Contexts in which instructions are experienced can include • the home • learning environments • games • sports • science experiments	Instructions explain how to do something in various contexts.	Discuss the importance of following instructions. Engage in activities that involve following instructions in various contexts. Identify instructions that help keep people safe in various contexts.	Instructions that are ordered to achieve a desired outcome can include • directions • procedures • recipes • computer programs • safety protocols	Instructions are ordered in a way that will produce a desired outcome.	Determine if instructions with two or three steps given in different orders still produce the desired outcome. Sequence two or three instruction steps to achieve a desired outcome.	Precise instructions can include • verbs • simple language • clear steps • a starting point • a stopping point	Instructions must be created using precision in order to achieve the desired outcome.	Describe instructions using precise words, pictures, or diagrams.
	Instructions can be presented by • speaking • pictures • video recordings • gestures	Instructions can be given in many ways.	Engage in activities that involve following instructions presented in various ways.	People who create instructions can include • teachers • parents • students • computer programmers	Instructions can be created by an individual or a group.	Exchange ideas to create three-step instructions that achieve a desired outcome.	Reliability of instructions means they consistently lead to the same desired outcome. Efficiency of instructions refers to designing in a way that yields desired outcomes with the least amount of wasted energy, time, or steps.	How instructions are created and communicated may or may not affect the outcome. Reliability and efficiency are important components of instructions.	Predict the outcome of instructions that have three to four steps. Discuss the reliability and efficiency of a set of instructions. Refine instructions to more efficiently achieve a desired outcome.

	Kindergarten			Grade 1			Grade 2		
							The reliability and efficiency of instructions can be affected by • form • order • language used • repetition		
	Instructions have one or more steps.	Instructions are followed in the order given.	Follow a sequence of two steps related to a learning experience. Identify the differences in outcomes when the order of two steps is changed. Verbally communicate a sequence of two steps for a given purpose.	Not following instructions during science investigations can be dangerous.	Following instructions can help to ensure safe and respectful behaviour during investigations.	Demonstrate safe and respectful behaviour by following instructions during investigations.	Daily activities that include repeated steps or instructions can include • brushing teeth in a repeated motion • tying one shoe and then using the same process on the other • creating repeating patterns	Instructions may be simplified by repeating steps.	Describe a situation in which repetition simplifies instructions.
							Debugging is the process of identifying and removing errors in a set of instructions to achieve the desired outcome.	Instructions may not always achieve the desired outcome.	Test a three- to four-step sequence to verify that the desired outcome is achieved. Remove or debug any errors in a set of instructions to achieve the desired outcome.
							Many activities at school and in the workplace require creative collaboration to improve ideas.	Creativity and problem solving can be enhanced through practice and collaboration with peers.	Discuss advantages of collaboration when engaging creatively to solve problems. Exchange ideas to design clear three- to four-step instructions, including repetition, to achieve a desired outcome.

	Kindergarten			Grade 1			Grade 2		
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 and Procedures	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
				Scientists perform investigations to answer questions.	Investigations are carried out as a way to try to understand the world.	Discuss why investigation is important in science.	Procedures scientists use to guide investigations can include • asking questions • making predictions • planning the investigation • observing and recording data • analyzing data • reaching conclusions • discussing observations and conclusions	Investigations have systematic procedures to guide the study of natural phenomena.	Reflect on how purpose and planning influence an investigation. Make various predictions based on questions to be investigated. Test predictions by observing and recording data.
				Investigation can involve • asking a question • making predictions about what the answer will be • gathering information • forming conclusions	There are steps to be followed during an investigation.	Ask a question and make a prediction about what the answer will be. Carry out a simple investigation with guidance. Describe the process of investigation using pictures and oral communication.	Being objective means not being influenced by personal thoughts, feelings, or expectations. Techniques that scientists use to remain objective can include • recording accurate observations • choosing appropriate tools • carefully measuring • basing conclusions on facts and data	Investigation in science involves collecting and analyzing data objectively to form conclusions.	Carry out simple investigations in an objective manner using appropriate tools and techniques.
				Observations can be gathered using the senses. Ways to record data include • words • pictures • numbers • colour-coding	Investigation involves making observations and recording them as data. Observations may be recorded as data in many ways.	Gather observations using various senses to answer questions. Use a provided template to record observations as words, pictures, numbers, or colours.	Data that can be combined includes observations and counts. Data that can be combined must be collected using similar procedures.	Data from investigations can be combined.	Collaborate to compile recorded data into a single list or chart.

	Kindergarten			Grade 1			Grade 2		
				Scientists keep records of data using • record books • computers • recordings (sound and video) • photographs	Accurate recording of data can ensure observations can be referenced in the future.	Use recorded data to reflect on an investigation.	Scientists may perform an investigation many times or compare with others to make sure results are similar. Repetition of an investigation includes performing the same procedure using the same materials in the same context.	Results of investigations should be consistent if repeated by another scientist.	Compare observations and data with others.
				Anyone can learn the skills and knowledge required to become a scientist and carry out an investigation. People who carry out investigations can include • teachers • students • scientists • detectives • doctors Talking to local scientists can help develop understanding of the local environment and beyond.	Investigations can be performed by individuals or groups.	Discuss the role of the scientist or a person in a science-related activity.	All recorded observations should relate to the purpose of an investigation.	The purpose of investigations is to find answers to specific questions.	Relate observations to the purpose of the investigation.
				Investigation includes safety and respect toward • people • plants • animals • environment	Investigation requires safety and respect.	Demonstrate safety and respect during investigations.	Creative scientific processes can include • asking questions • connecting to scientific knowledge • planning ways to problem solve • designing • inventing • trial and error	Creative scientific processes can be used during investigation to solve problems and to learn.	Apply creative scientific processes during investigation.
				Scientists perform investigations to satisfy curiosity, solve a problem, or meet a need.	Investigations can be sparked by curiosity.	Generate questions about natural phenomena.			

	Grade 3			Grade 4		
Organizing Idea	Matter: Understandings of the physical world are deepened through 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 management of waste materials and describe potential personal and environmental impacts.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Natural materials are any product or physical matter that comes directly from plants, animals, or the ground. Processed materials are modified from natural materials and do not occur in the natural world. Processed materials have been designed and manufactured for a particular purpose. First Nations, Métis, and Inuit communities respectfully use natural materials, including • trees • rocks • ice • shells • plants • animals First Nations, Métis, and Inuit communities use natural materials for particular purposes, including • lodges • tipis • iglus • medicines • teas • clothing • tools	Materials exist in natural and processed forms. Use of materials for First Nations, Métis, and Inuit traditional knowledge is guided by balance and harmony with the land.	Identify examples of natural and processed materials. Diagram the steps of how a natural material is processed to make a new material. Compare natural and processed materials. Discuss how use and selection of materials is guided by relationships with the land for First Nations, Métis, and Inuit communities.	Methods of waste management can include • using landfills • combusting • composting • recycling Waste materials may be solids, liquids, or gases.	Waste materials should be managed responsibly based on potential impact. New materials created from natural materials can produce waste that must be carefully managed to protect the environment.	Research the environmental impact of different methods of waste management.
	Three states of matter are solid, liquid, and gas. Matter can change state if heated or cooled.	Materials can be changed to alter their state.	Safely perform simple experiments to demonstrate the three states of matter by heating and cooling water. Discuss examples of daily activities that include heating and cooling.	Symbols are used to identify dangerous materials. Hazard symbols used to identify dangerous materials can include • explosive • flammable • corrosive • poisonous Dangerous materials may be solids, liquids, or gases.	Some natural and processed materials may be dangerous and can be harmful to individuals' health and to the environment if misused or disposed of unsafely.	Identify dangerous products or materials used at home, at school, and in the community. Interpret consumer chemical hazard symbols. Explain the importance of safe disposal of dangerous materials as a way to minimize pollution to soil, water, and air.

	Grade 3			Grade 4		
						Specify practices that individuals can follow to ensure personal and community safety from dangerous materials.
	A solid is a state of matter that has a definite shape and volume. A liquid is a state of matter that has a definite volume but no definite shape. A liquid flows and takes the shape of the container it is in. A gas is a state of matter that has neither definite shape nor definite volume. A gas flows easily and expands to the size of the container it is in. Volume is the amount of space a solid, liquid, or gas takes up.	Solids, liquids, and gases have definite properties.	Discuss solid, liquid, and gas states of matter in terms of shape and volume.	Ways to reduce the environmental impact of waste materials can include • reducing • reusing • recycling • repurposing • repairing	People can make choices that reduce the environmental impact of waste materials.	Apply knowledge of recycling, reusing, reducing, repurposing, and repairing materials to develop a personal plan to reduce waste. Research local programs for recycling, reusing, reducing, repurposing, and repairing materials. Represent the recycling process using diagrams.
	Melting is a change of state from solid to liquid. Freezing is a change of state from liquid to solid. Evaporation is a change of state from liquid to gas. Condensation is a change of state from gas to liquid. The temperature at which a material changes from solid to liquid is called the melting point. The temperature at which a material changes from a liquid to a solid is called the freezing point. The melting and freezing points of a material are the same temperature. The temperature at which a material changes from liquid to gas is called the boiling point.	Materials can be described by their unique physical properties of melting/freezing and boiling points.	Research and compare the melting/freezing and boiling points of various materials, including water.			

	Grade 3			Grade 4		
	The melting/freezing point of water is 0ºC. The boiling point of water is 100ºC.					
	In the water cycle, liquid water evaporates into water vapour, condenses to form clouds, and precipitates back to Earth. Water in the environment can change state from solid to liquid and back again. Water in the environment can change state from liquid to gas and back again.	The water cycle is a process of change in which water on Earth moves continuously between bodies of water, land, and the atmosphere.	Describe and diagram the changes of state of water in the environment using the water cycle.			
	A reversible change is a change that can be undone. A permanent change is a change that cannot be undone.	Changes to materials can be permanent or reversible, depending on the properties of the given materials.	Discuss examples of changes to materials that are permanent and examples of changes to materials that are reversible. Classify changes to materials as permanent or reversible.			

	Grade 3			Grade 4		
Organizing Idea	Energy: Understandings of the physical world are deepened through 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 movement of objects.			Students investigate how forces can act on objects without contact.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Newton's first law of motion states that an object that is at rest will stay at rest until some force makes it move, and an object that is in motion will stay in motion until a force stops it.	A force is a push or pull upon an object resulting from an interaction with another object or substance.	Describe where forces may exist in everyday situations. Perform simple experiments to demonstrate Newton's first law of motion through observing, starting, or stopping the movement of an object.	Non-contact forces occur between objects that are not in direct contact. Non-contact forces occur because of attraction or repulsion.	Non-contact forces are invisible forces that can affect objects and materials.	Describe how non-contact forces interact with objects.
	Contact forces include forces that • are exerted by a person or an object upon another object (applied) • oppose the movement of objects when they come into contact with other objects or surfaces (friction) • are exerted by pulling on a string or rope connected to an object (tension) • are exerted by a compressed or stretched elastic object or spring upon any object that it is in contact with (elastic or spring) Ways to apply a contact force to an object include • stretching • pulling • squeezing • pushing	Contact forces occur between objects touching each other.	Conduct investigations regarding the effects of friction, tension, applied force, and elastic or spring forces on the movement of objects.	Non-contact forces include magnetism and gravity. Magnetism is the property of attracting or repelling magnetic materials. Gravity on Earth pulls all objects toward the ground.	Non-contact forces are caused by a specific source that can be identified.	Identify the source of non-contact forces. Perform simple experiments that demonstrate the effect of gravity on an object.
	Vocabulary used to describe the strength of a force can include strong and weak. Vocabulary used to describe the direction of a force on an object can include • upward • downward • from the left • from the right • from both sides • from all directions	A force is characterized by its direction and strength.	Describe forces using vocabulary representing both direction and strength.	Magnetic materials contain iron, cobalt, or nickel.	Some materials are attracted to a magnet and can become magnetized.	Conduct investigations regarding the push and pull of magnetism on objects. Create a magnet using a non-magnetized object.

	Grade 3			Grade 4		
	The effects of force can include a change in the • shape of an object • size of an object • movement of an object	Forces can affect the properties and movement of objects in different ways.	Predict how different forces and directions of forces could affect stationary objects. Perform simple experiments to demonstrate how forces can change the shape and/or size of objects. Describe interactions between objects when a force is applied.	Properties that can affect how a non-contact force acts on an object include the object's mass and the type of material it is made from. Strength of non-contact forces decreases as objects get farther apart.	The effects of forces on objects depends on the properties of materials. Strength of non-contact forces depends on the distance between objects. Non-contact forces may act through certain materials.	Experiment with factors that influence the force of a magnet, including distance and properties of materials.
	Changes to an object's movement when a force is applied include • speeding up • slowing down • starting • stopping • changing direction	Forces can cause a change in an object's movement.	Predict how the movement of an object is affected by different strengths and directions of force. Describe the effect of contact forces on the movement of objects.	Magnets have two poles. Magnetic poles are known as north and south. Opposite poles attract each other and like poles repel each other. Both poles attract magnetic material.	The poles of a magnet affect each other and magnetic material.	Explain interactions between the poles of magnets.
	The effect of a force can be investigated by observing and measuring the distance an object travels after a contact force.	The effects of forces can be compared through observation and measurement.	Test the effects of increasing forces on stationary objects.	Items that contain magnets include • refrigerators • computers • speakers and headphones • vehicles • MRI machines • musical instruments	The capacity of magnetism to attract and repel can be useful in making common objects.	Design a device that uses magnetism.
	Simple machines can include • levers • wheels • axles • inclined planes • wedges Simples machines are used to reduce the effort needed to lift or move objects. Many First Nations, Métis, and Inuit have designed, tested, and continue to use simple machines that decrease effort, which can include • antler wedge • paddle • Inuit scraping tools such as an ulu • Métis travois	The strength and direction of a force can be changed by simple machines.	Represent contact force in relation to the use of simple machines through diagrams. Demonstrate how simple machines work to reduce the effort needed to lift or move objects. Design a device that uses simple machines. Safely work with tools, materials, and equipment. Research local First Nations, Métis, and Inuit simple machines and describe their purpose.			

	Grade 3			Grade 4		
Organizing Idea	Earth Systems: Understandings of the living world, Earth, and space are deepened through investigating natural systems and their interactions.					
Guiding Question	How are changes on Earth's surface influenced by various factors?			How does Earth sustain life?		
Learning Outcome	Students analyze and explain how the surface of Earth changes.			Students investigate the systems of Earth and reflect on how interconnections sustain life.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Changes that can occur to Earth's surface over a long period of time can include • mountains wear down • rivers change course • lakes and seas dry out and can reappear • glaciers move, advance, and recede Events that can change Earth's surface in a short period of time can include • volcanic eruptions • earthquakes • landslides • tsunamis • flooding • melting and freezing Changes to Earth's surface can be shared by First Nations, Métis, and Inuit through • stories • traditional knowledge • language	Earth's surface changes over time. Relationships with land have provided intergenerational knowledge of landscapes for many First Nations, Métis, and Inuit.	Describe how natural events change Earth's surface. Discuss changes to Earth's surface over time in stories shared by or through intergenerational knowledge of First Nations, Métis, or Inuit. Compare young mountain ranges to old mountain ranges. Investigate natural events that have changed local landforms or landforms within the province of Alberta.	Systems of Earth include • land • air • water • organisms Earth scientists call Earth's systems the "spheres," including • lithosphere (land) • atmosphere (air) • hydrosphere (water) • biosphere (organisms)	Systems of Earth are interconnected to sustain life. First Nations, Métis, and Inuit hold understandings of the interconnectedness of all living things.	Research how human activity can impact the relationships between land, air, water, and organisms. Represent the interconnectedness of land, air, water, and organisms.
	In Alberta, the surfaces of most bodies of water change from liquid in summer to solid in winter.	Surfaces of bodies of water can change between solid and liquid state.	Investigate the conditions under which bodies of water can change state. Discuss why it is important to be safe around bodies of water that have a surface of ice.	Sunlight is more direct at the equator. The equator is warmer than the poles. Sunlight is more direct and the length of daylight is longer in summer than in winter.	Earth's surface is warmed by the Sun, allowing for life.	Explain how the amount of sunlight and warmth provided by the Sun throughout the year affects characteristics and behaviours of plants and animals in various locations on Earth.
	Water or ice can move or remove material as it flows. Current glaciers are the remnants of ice sheets that once covered all of Canada. Ice sheets were up to 4000 m thick in Alberta about 18,000 years ago.	Water can shape the landscape of Earth.	Represent how the movement of water on Earth changes the landscape. Represent how water flow starts with rain, melting snow, or a glacier, moves through different bodies of water, and drains into the ocean.	Water is a basic need for plants and animals and provides habitat for many organisms. For many First Nations, Métis, and Inuit, water is sacred, as it sustains life.	Most organisms on Earth require water to meet their needs. First Nations, Métis, and Inuit hold a sense of responsibility to protect water and sources of water.	Discuss ways that plants and animals use water to meet their basic needs. Research plants and animals that exist in various bodies of water. Discuss the importance of water to First Nations, Métis, and Inuit and how it sustains life.

	Grade 3			Grade 4		
	Melting glacier ice creates runoff that formed and helps maintain many of the major rivers in Alberta. The Earth is warming up from natural and human causes, which is melting the remaining glaciers faster.		Identify glacier-fed rivers that are local or within Alberta.			
	Wind and water can interact to move or remove material, which changes a landscape. Landscapes that have been shaped by interactions with wind and water include Alberta's badlands and the Grand Canyon in the United States.	Changes to Earth's landscape can occur through interactions with wind and water.	Describe how wind and water change landforms over time.	Changes made to one system that can impact another system can include • number of organisms • food sources • habitat • water cleanliness • migration patterns • weather patterns	Changes in one of Earth's systems can affect other systems. Small changes to an environment can significantly impact organisms in that environment.	Explain how changes made to one system can have impacts on other systems. Research and discuss how Indigenous communities work alongside Parks Canada to further understand multisystem impacts.
	Human activities that can impact the land in positive and negative ways include • living on the land • building towns and cities • getting and using resources • farming • pollution • stewardship Plant and animal activities that can shape landscapes include • overpopulation • using resources • parasites, such as the mountain pine beetle • plants or animals burrowing • beavers chewing down trees	Human, animal, and plant activities can cause changes to land on Earth.	Investigate how plants and the activity of animals change Earth's surface. Research how human activities have changed Earth's surface. Discuss the interconnectedness of human activities and responsibilities to maintaining Earth.	Natural resources include • air • water • soil • minerals • metals • organisms	Earth's systems include natural resources.	Investigate natural resources found locally.
	Landscapes on Earth contain layers that have been deposited over long periods of time.	The history of landscapes on Earth can be explained through examining their layers.	Examine how layers of Earth's surface hold information about the past.	Conservation is the preservation and protection of Earth's systems from pollution, depletion, or extinction. Conservation can be informed by a variety of • methods • understandings • First Nations, Métis, and Inuit perspectives • processes	Conservation can impact land, natural resources, and organisms. Many First Nations, Métis, and Inuit practise traditional methods of conservation.	Identify ways in which plants, animals, and land can be protected or maintained through conservation practices. Discuss First Nations, Métis, and Inuit conservation practices that include giving and taking only what is needed.

	Grade 3			Grade 4		
	Soil includes • living plants and animals • decaying plants and animals • rock particles • air • water	Soil is a continually changing upper layer of Earth's crust in which plants grow.	Examine soil in the local community. Describe how soil helps plants and animals survive.	Conservation practices can be implemented in natural and cultivated areas. Conservation involves creating parks, including • local • provincial • national	Conservation aims to minimize disturbance and impact on plants, animals, and land.	Identify examples of conservation practices in natural and cultivated areas. Evaluate the benefits of creating provincial and national parks. Discuss how to balance human use of parks and conservation of wildlife.
	Habitat is a natural environment where a plant or an animal establishes a home. Animals whose habitat is soil can include • worms • mice • gophers • rabbits	Soil provides a habitat for many animals.	Research animals in Alberta that spend all or part of their life underground. Consider how animals that live underground change soil.	Conservation can be practised through actions around • use of electricity • use of water • reducing waste • daily life choices	Conservation of Earth's systems requires taking deliberate actions. Conservation of Earth's systems requires planning and design.	Describe examples of personal actions that contribute to conservation in daily life. Create a plan to implement a conservation practice in a local environment.

	Grade 3			Grade 4		
Organizing Idea	Living Systems: Understandings of the living world, Earth, and space are deepened through investigating natural systems and their interactions.					
Guiding Question	How do plants and animals interact?			How are organisms designed for survival?		
Learning Outcome	Students analyze and describe how plants and animals interact with each other and with the environment.			Students analyze organisms and relate their external structures to functions.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	A food chain displays the order in which plants and animals depend on each other for food. A food chain can be represented through an illustration, a diagram, a story, or words. A food chain only represents one possible way that plants and animals interact. Plants and animals are part of many different food chains.	Plants and animals interact with each other in ways that can be represented by a food chain.	Represent various food chains in local and other Canadian environments.	Micro-organisms include bacteria. Ways to classify organisms can include • appearance • habitat • structures Structures, including body parts, are features of organisms that serve a purpose or function.	Organisms are individual animals, plants, or micro-organisms. Organisms can be classified in various ways.	Find examples of local plants and animals and describe their appearance and habitat.
	Carnivores eat only animals. Herbivores eat only plants. Omnivores eat animals and plants.	Animals can be classified as carnivores, herbivores, or omnivores based on what they eat.	Identify carnivores, herbivores, and omnivores in a food chain.	External structures of organisms can include • roots • stems • leaves • flowers • fruit • claws • teeth • legs • shells • skins	Organisms have external structures.	Represent the external structures of plants and animals. Find examples of local plants and identify their external structures. Classify plants and animals by external structures and appearance.
	Sensory stimuli can include • water • food • temperature • light Animals can use their senses to detect the presence of food, predators, or other members of their species.	Plants and animals sense and respond to stimuli in order to survive.	Investigate how plants and animals respond to stimuli in the natural environment. Discuss how plants and animals respond to stimuli to survive.	Functions of structures in an organism can include eating, moving, and protecting.	Organisms have structures that serve various functions.	Compare structures of various plants and animals in relation to function. Explain the relationship between external structures and function.

	Grade 3			Grade 4		
	Actions that can be taken to protect plants and animals in the local environment include • respectfully interacting with natural environments • minimizing disturbance to plants and animals • being aware of animal crossings • following fishing and hunting regulations • counting and tracking populations	Understanding the interactions of plants and animals in a particular environment helps us protect them.	Reflect on actions that can be taken to protect plants and animals in the local environment. Demonstrate respectful and safe practices during observations of plants and animals.	Movements supported by structures of organisms can include • flying • crawling • swimming • hopping • slithering • jumping • running	Organisms have structures that support movement.	Connect structures of various animals to movement.
	Diverse plants and animals can be found in Canada's • forests • prairies • lakes and rivers • mountains • oceans	Plants and animals exist in variety and are dispersed over Earth.	Investigate plants and animals in various environments in Alberta and Canada.	Ways that external structures support growth and survival include how plants and animals sense their environment and meet their needs.	Organisms have external structures that support growth and survival.	Describe how external structures are connected to survival.
	Plants and animals may depend on each other for food and habitat. First Nations, Métis, and Inuit knowledge of plants and animals can include • animal behaviour • diet • migration paths • patterns	Plants and animals depend on each other and their environment to survive.	Explain the interconnections in the environment, including how plants depend on animals and how animals depend on plants to survive. Relate First Nations, Métis, and Inuit peoples' connection with the environment to their knowledge of and relationships with plants and animals.			

	Grade 3			Grade 4		
Organizing Idea	Space: Understandings of the living world, Earth, and space are deepened through investigating natural systems and their interactions.					
Guiding Question				What are astronomical phenomena?		
Learning Outcome				Students investigate and describe astronomical phenomena in connection to daily life.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
				Objects in space include • the Moon • the Sun (a star) • stars and their planets • planets and their moons Technologies for viewing astronomical phenomena can include • binoculars • telescopes • planetariums	Astronomical phenomena are observable events that happen among objects in space.	Record observations of stars, planets, the Sun, and the Moon, using protective equipment when necessary. Compare technologies for viewing astronomical phenomena.
				Most astronomical phenomena are more easily observed at night. The Sun is not observable at night.	Astronomical phenomena can be observed differently during the day and night.	Compare observations of astronomical phenomena taken during the day and night.
				Historically, people noticed groups of stars and created patterns out of them for purposes like navigation and tracking the passage of time. The recognizable patterns of stars are called constellations. Constellations have names that come from a variety of sources. Stars in the same constellation may be millions of kilometres apart. Star maps of the constellations have been created by many First Nations and Inuit.	Groups of stars can appear to be arranged in recognizable patterns when observed from Earth.	Research constellations in relation to location in the sky and seasons when they can be observed. Investigate First Nations, Métis, and Inuit stories of star names and constellations.
				Polaris, the North Star, shows the approximate direction of the North Pole. The Orion constellation can be used to find the South Pole.	Stars can provide ways to navigate.	Explain ways in which stars can be used for navigation. Explore the local traditional names of the North Star and relate them to navigation.

	Grade 3			Grade 4		
				The Sun and stars appear to travel across the sky from east to west because of the rotation of Earth.		
				The Moon has been used to measure time throughout history. The Western (Gregorian) calendar is based on the amount of time it takes Earth to revolve around the Sun. Most of society follows the Western (Gregorian) calendar in daily life. Indigenous peoples traditionally use a lunar calendar to measure time.	Many cultures have unique observations of astronomical phenomena that are connected to time, place, and daily life.	Research how people have understood and continue to understand and respond to astronomical phenomena. Represent observations of astronomical phenomena as they connect to patterns or repeating cycles, including seasons and plant and animal growth and behaviour in a local area. Describe the connections between the seasonal movements and activities of local Indigenous people as depicted in a traditional lunar calendar.

	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	To what extent is creativity related to contributions in science?			How can design resolve a problem?		
Learning Outcome	Students investigate creativity and its relationship to computational thinking.			Students investigate and apply design in the context of computer science and technology.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Computational thinking can include • 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 was made	Computational thinking is a problem-solving process that requires creativity. Computational thinking enables humans to more efficiently communicate with computers. Humans use creativity to develop instructions that can be followed by people or machines.	Create a set of instructions that could be followed by a human or a machine to complete a task.	The design process involves • understanding the problem • forming ideas (ideating) • planning • creating • analyzing • troubleshooting (debugging) Feedback helps to ensure all needs are considered during the design process. Designs are tested to determine if they meet needs.	Design is the structured process of creating something that can be used to meet needs.	Plan a sequence of steps necessary to create a model that addresses a design challenge. Create a model for a specific purpose. Provide feedback to others during the design process. Describe a test to confirm if a model meets all needs.
	There are many ways to achieve the same outcome. Divergent thinking is the process of generating multiple unique ideas or solutions.	Creativity can be used to develop different ways to achieve the same outcome. Creativity involves divergent thinking.	Collaborate to write two sets of instructions that achieve the same outcome.	An algorithm is a sequence of instructions.	The process of design is used to create algorithms.	Collaborate with others to design an algorithm to solve a simple problem.
	Creativity is an important part of computer science, technology, and engineering.	Creativity is a means to explore possibilities.	Identify examples of creativity in computer science, technology, and engineering.	Artifacts are objects or products made by humans, machines, or computers through the process of design. Design can produce many artifacts, including • algorithms • models • prototypes • blueprints • programs • experiments • objects Design can deal with open, complex problems.	Design is a process that starts with an idea of what should happen and progresses to a more concrete artifact.	Implement a design plan by creating physical or computational artifacts to achieve specific outcomes or purposes. Share ideas for possible improvements to a design or the design process used.

	Grade 3			Grade 4		
	Creativity involves imagination, observation, and making connections. Canadians are responsible for many creative inventions.	Creativity is the ability to combine, change, or reapply existing ideas to produce something new.	Describe skills and processes that are important to creativity. Discuss how new technologies, engineering, and computing are developed through creativity. Research a famous Canadian creative invention.	Design processes should consider criteria, including • user needs • materials availability • cost • purpose • environment in which it will be used • aesthetics	Design processes consider purpose and criteria in the creation of an ideal artifact.	Design an artifact that considers the design requirements.

	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 develop knowledge in science?			How can evidence advance knowledge in science?		
Learning Outcome	Students engage in investigation and consider its potential to build understanding of the natural world.			Students investigate the nature of evidence and reflect on its role in science.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Three types of scientific investigations are descriptive, comparative, and experimental. Descriptive investigations involve gathering observations to describe the physical world. Comparative investigations involve collecting sets of data to make comparisons. Experimental investigations involve designing experiments to determine if there is a cause-and-effect relationship.	Investigation is a process that aims to explain observable phenomena. Investigation can be approached in multiple ways depending on context and purpose.	Investigate through description, comparison, and simple experiments. Develop conclusions from descriptive, comparative, and experimental investigations based on observation.	Types of data include qualitative and quantitative. Qualitative data is descriptive and usually categorized and expressed using words. Quantitative data is measured and expressed using numbers and counts.	Evidence is produced through the study and interpretation of data.	Analyze data collected from investigations. Differentiate between qualitative and quantitative data.
	Scientific attitudes and values are based on objectivity and include accuracy and honesty in recording and communicating data. Objectivity in science is an attempt to learn about the world using methods that remove the influence of personal thoughts, feelings, and expectations.	Investigation requires the understanding and application of scientific attitudes and values.	Identify possible issues that may occur during an investigation, including dishonestly recording and communicating data. Demonstrate objectivity during an investigation by accurately and honestly recording and communicating data.	Relevant data addresses the question that is being investigated. All relevant data must be considered.	Evidence can be used to support or refute predictions based on the question being investigated. Some observations and data are not relevant to the question being investigated.	Determine what observations and data should be collected to address the question being investigated.
	Investigations can build on previous knowledge by • confirming previous understanding • finding new evidence that conflicts with previous understanding • deepening previous understanding	Investigations build on previous knowledge and contribute to learning.	Reflect on how conducting an investigation contributes to learning.	Reliable means that observations and measurements consistently produce similar data and evidence. Valid means that data and evidence is gathered using observations and tests that measure what they are supposed to. Evidence is reliable and valid if objectivity was maintained during data collection and analysis through • gathering enough data • performing enough trials	Reliable and valid data and evidence leads to appropriate conclusions during investigations. Conclusions drawn must reflect the data and evidence collected in order to be valid. Only conclusions drawn from reliable and valid data and evidence, and analyzed using scientific methods, are trustworthy.	Collect reliable data and evidence from investigations. Interpret data collected from investigations. Draw valid conclusions using evidence from investigations. Evaluate the trustworthiness of conclusions drawn during simple investigations based on the data, evidence, and methods used.

	Grade 3			Grade 4		
				• using appropriate procedures and tools • recording and representing data accurately		
	Observations and results from investigations can be analyzed by • making connections to previous knowledge • asking questions • noticing changes that happen • discussion • collaboration	Observations and results from investigations should be analyzed to confirm accuracy and build knowledge.	Discuss observations and the results of investigations. Analyze observations and the results of investigations. Ask questions about observations and the results of investigations.	Data gathered during a descriptive investigation is used as evidence to describe characteristics of components of the physical world. Data gathered during a comparative investigation is used as evidence to make comparisons between components of the physical world. Data gathered during an experimental investigation is used as evidence to determine cause and effect.	Data can be gathered in a variety of ways to build up a body of evidence.	Collect data to answer questions about natural phenomena using descriptive, comparative, or simple experimental investigations. Describe the importance of collecting data using a variety of investigational approaches.
	Scientists often use their own investigations and those of other scientists to develop new questions for further study.	Analysis of data and scientific results may spark new questions for investigation.	Develop new questions for further study from an analysis of data and the results of a simple investigation.	New evidence may require the scientific community to adjust previous thinking or predictions.	Ongoing collection of evidence allows the scientific community to attach new learning to what was previously understood.	Research how past scientific understandings have changed based on new evidence.
	Sources of information or data can include • experts • text • personal observations • websites • Elders • community members Some sources of information are more trustworthy than others.	Information or data from investigations can be used to make decisions.	Use data to determine if a statement is true or false. Discuss the trustworthiness of sources of information or data.	Data from observations can be recorded or measured more accurately using tools and technology.	Accurate evidence requires the careful use of measuring tools and technology.	Produce reliable and valid evidence by using appropriate measuring tools and technology to collect accurate data. Discuss technologies used in investigations to improve observation or measurement.
				Ways to share scientific evidence include • written texts • verbal presentations • oral traditions • graphs • tables • charts • diagrams • simulations • models	Evidence can be summarized, represented, and shared in multiple ways to build a body of knowledge.	Summarize, represent, and share evidence from an investigation in a variety of ways. Represent data in graphs, tables, charts, diagrams, simulations, or models.

	Grade 3			Grade 4		
				The common system of measurement used by the scientific community is the Système international d'unités (International System of Units). Système international d'unités can be abbreviated as SI units. Système international d'unités includes • time • length • mass • temperature	A common system of measurement and symbols gives the scientific community a way to communicate data and evidence.	Interpret representations of data and evidence that use SI units.

	Grade 5			Grade 6		
Organizing Idea	Matter: Understandings of the physical world are deepened through 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 to describe 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 and Procedures	Knowledge	Understanding	Skills and Procedures
	Ideas represented by the particle model of matter include the following: • All matter is made up of tiny particles. • Particles of matter are always moving. • Particles of matter have spaces between them.	All matter is made up of small particles. The particle model of matter represents the arrangement and behaviour of particles in solids, liquids, and gases.	Represent solids, liquids, and gases using the particle model of matter through words, drawing diagrams, constructing models, and/or performing role plays.	The particle model of matter states that heating matter makes particles move faster. As particles move faster the space between them increases. A phase change is a change from one state of matter to another.	Particles change speed and distance from each other when heated or cooled.	Explain phase changes using the particle model of matter.
	In solids, the particles are close together and vibrate in place. In liquids, the particles are separated by spaces and are able to slide past each other. In gases, the particles are separated by large spaces and are constantly moving in all directions.	The movement and arrangement of the particles determines the state of matter of a substance.	Relate the arrangement and behaviour of particles to the state of matter.	The degree Celsius is a unit scientists use to measure temperature. The symbol for degree Celsius is °C. The Celsius scale was created 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. The faster particles move, the higher the temperature of a substance.	The speed at which particles move indicates the temperature of a substance.	Discuss the connection between movement of particles and temperature in degrees Celsius. Predict how different temperatures would affect the movement of particles in solids, liquids, and gases. Relate the melting/freezing and boiling points of water to the Celsius scale. Identify safety practices associated with temperature and use of measurement tools.
	Attractive forces between particles are strongest in solids and weakest in gases.	Attractive forces exist between particles.	Describe the impact that attractive forces have on movement and arrangement of particles in solids, liquids, and gases.	The design of temperature tools, including thermometers and thermostats, is based on the expansion and contraction of matter. A thermometer measures the expansion or contraction of a liquid, using a scale.	Most matter expands when heated and contracts when cooled.	Describe how a thermometer works. Evaluate the effectiveness of a student-created thermometer. Conduct investigations related to the expansion and contraction of substances when they are heated and cooled.
	Physical properties of matter include • mass • volume • density • compressibility Mass is the amount of matter in a solid, liquid, or gas.	The arrangement and movement of particles affects the physical properties of matter.	Measure the mass of solids and liquids using a balance scale and standard units of measurement. Measure the volume of liquids using appropriate instruments and standard units of measurement.	Water has the unusual property of having greater volume in solid form than in liquid form. Because of water's unusual property, it is less dense in solid form than in liquid form.	Bodies of water are able to sustain life in winter due to water having unique physical properties.	Conduct a simple experiment to demonstrate that liquid water is more dense than solid water (ice). Predict what would happen to plants and animals living in bodies of water if solid water (ice) were more dense than liquid water.

	Grade 5			Grade 6		
	Mass is measured in kilograms (kg). Volume of a liquid is usually measured in litres (L). Density is a measurement that compares the mass of a solid, liquid, or gas to its volume. The greater the mass of a solid, liquid, or gas as compared to its volume, the higher its density. Density can be described using the phrases • high density • low density • more dense • less dense Compressibility is the ability of a liquid or gas to be reduced in volume when under pressure.		Compare the density of different solids and liquids using qualitative language. Account for differences in densities of solids, liquids, and gases using the particle model of matter. Compare the density of objects of similar volumes using appropriate vocabulary. Engage in scientific investigations on the compressibility of air. Practise safe and appropriate use of materials, tools, and equipment.	Bodies of water with winter temperatures below the freezing point of water form an insulating sheet of ice on their surface that protects aquatic life.		
				Infrastructure that needs to consider a materials response to temperature can include sidewalks, bridges, and roads. Thermal expansion is the response materials have to heat.	The design and building of infrastructure takes into consideration a material's response to temperature change.	Conduct research about the function of materials, based on their thermal expansion, in a variety of infrastructure. Explain the significance of thermal expansion in the design and building of structures.
				During a change of state, the volume of the material may change but the mass remains constant.	The makeup of a particle, including its mass, remains the same regardless of a change of state.	Conduct a controlled experiment to determine whether the mass of a material is the same after a change of state. Analyze the results of a controlled experiment where a change of state occurs.

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Organizing Idea	Energy: Understandings of the physical world are deepened through 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 and describe interactions between objects that lead to change.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Each force that acts in water or air has an opposite force that works against it.	Forces affect the movement of objects differently in water and air.	Identify opposite forces that act on objects in water and air.	Interaction is a process where two or more objects have an effect on each other. Contact interactions result in contact forces. Non-contact interactions result in non-contact forces.	An interaction between objects results in a force that can affect the shape, size, and/or position of the objects.	Investigate how forces act on and influence the shape, size, and/or position of objects. Plan and conduct experiments to determine the relationship between the physical properties of objects and the changes in shape, size, and/or position that occur when a force is applied. Use materials, tools, and equipment safely while experimenting with forces in interactions.
	The four forces that act on the movement of living things and constructed objects in the air are • thrust • drag • lift • weight Thrust is a force that acts in the direction of movement in the air. Drag is a force that acts opposite to the direction of movement in the air. Lift is an upward force that acts to overcome the weight of an object and hold it in the air. Weight is a force caused by gravity that acts in a downward direction.	There are four forces that act on the movement of living things and constructed objects in the air.	Diagram, using relevant scientific vocabulary, how forces act on living things or constructed objects that fly through the air. Explain how the opposite forces of thrust and drag affect the movement of living things and constructed objects that fly. Explain how the opposite forces of lift and weight affect the movement of living things and constructed objects that fly.	External forces are forces that act on an object from outside the object. Internal forces are forces within an object. External forces cause internal forces within an object. External and internal forces that can affect the shape, size, position, and/or movement of objects include • applied force • friction • tension • elastic or spring force • compression • shear • torsion Applied force is exerted by a person or an object upon another object. Friction forces oppose the movement of objects when they come into contact with other objects or surfaces.	An interaction includes internal and external forces that can affect the shape, size, position, and/or movement of objects.	Conduct investigations regarding the effects of external and internal forces on the shape, size, position, and/or movement of objects. Identify the force(s) that are acting on an object during a specific interaction. Use scientific vocabulary when analyzing interactions.

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				Tension is a force exerted by pulling on a string or rope connected to an object. Elastic or spring force is exerted by a compressed or stretched elastic object or spring upon any object that it is in contact with. Compression is a force exerted on an object that squeezes, squashes, or compacts it. Shear is a force that pushes parts of an object in opposite directions resulting in bending or breaking. Torsion is a force that twists an object.		
	The principles of flight affect several things, including • speed • horizontal or vertical movement • level of flight • straight and level flight • pitch, roll, and yaw Human fascination with flight has resulted in advancements in technologies informed by principles of flight. Traditional technologies developed by diverse cultures that reflect understanding of forces of flight include • atlatl • bow and arrow • slingshot • catapult	The principles of flight explain how the four forces act in combination and affect the movement of living things and constructed objects that fly through the air.	Pose questions related to the principles of flight. Conduct investigations that demonstrate various forces of flight. Explain how forces of flight affect the movement of living things and constructed objects that fly. Describe examples of traditional and modern technologies developed by diverse cultures that reflect understanding of forces of flight. Examine careers related to technologies based on the scientific principles of flight.	Plasticity is a material property that leads to permanent deformation. Elasticity is a material property that enables temporary deformation.	Change in an object's shape can be temporary or permanent depending on the properties of the material and the nature of an interaction.	Identify the type of change objects underwent in various interactions. Plan and conduct investigations that demonstrate temporary and permanent changes to an object's shape. Use scientific vocabulary, including elasticity and plasticity, when describing interactions between different materials.
	Buoyant force is an upward force exerted by a liquid that opposes the weight of a partially or fully immersed living thing or object. Buoyancy is the tendency of something to rise or float in a liquid.	The relationship between buoyant force and gravity affects the behaviour of an object in water.	Analyze the results of a controlled experiment regarding why things float, sink, or remain at the same level in water using various substances and materials as variables.	Newton's third law of motion states that for every action there is an equal and opposite reaction. The forces resulting from an interaction are action force and reaction force.	Interaction involves a pair of opposing forces acting on the two objects involved.	Perform a simple experiment or construct a device that demonstrates Newton's third law of motion. Represent the action-reaction force pairs in diverse scenarios.

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	The behaviour of an object in water includes floating (positively buoyant), sinking (negatively buoyant), and remaining at the same level (neutrally buoyant).					
	Archimedes' principle states that buoyant force is equal to the weight of water displaced. Objects with the same volume, but a different mass, will displace the same amount of water. Objects and materials that are less dense than the liquid in which they are placed will be buoyant. Water displacement can be measured using standard units, including cubic centimetres (cm^3) or millilitres (mL).	Buoyancy and density are related.	Explain the relationship between buoyancy and density. Determine the water displacement of various objects using appropriate instruments and standard units.			
	Design considerations for floating objects include density, stability, and streamlining. Design considerations for flying objects include density, stability, streamlining, and aerodynamics.	Forces must be considered when designing objects that must float or fly, as their effects can be changed by designing objects in different ways.	Construct a device that can float and that meets performance criteria. Construct a device that can move through air and that meets performance criteria. Select materials that best suit the purpose and design of the model. Revise a prototype based on feedback. Practise safe and appropriate use of tools, equipment, and materials while making a device or measuring.			

	Grade 5			Grade 6		
Organizing Idea	Energy: Understandings of the physical world are deepened through investigating matter and energy.					
Guiding Question	What are energy resources?			How are energy resources used?		
Learning Outcome	Students investigate and analyze various energy resources.			Students evaluate the use of energy resources and explain factors that influence choice.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Energy resources include • solar • wind • water and hydro • tidal • biomass • fossil fuels • geothermal • nuclear	Energy resources can be used directly or transformed in useful ways for daily living.	Compare various energy resources based on their characteristics. Identify common objects in the classroom or at home that require energy resources to make or operate them.	Factors to consider when choosing which energy resources to use include • availability • accessibility • extraction process • efficiency • technologies required to transform for different purposes • transportation and distribution • societal impacts • economic impacts • environmental/climate impacts	There are several factors to consider when determining use of energy resources.	Identify economic and environmental factors that might be considered when making decisions about use of energy resources. Identify the scientific and economic reasons why fossil fuels, including oil and natural gas, are currently the principal energy resources used in Alberta. Discuss the scientific, environmental, and economic considerations around energy distribution and use in the province of Alberta. Examine energy distribution and use in another country and compare it to Alberta.
	Alberta's principal energy resources include • fossil fuels • hydro • wind • biomass	Availability of energy resources is based on the weather patterns and natural features of a location or an area.	Explain the relationship between Alberta's weather patterns, natural environmental features, and the province's principal energy resources. Examine principal energy resources in various provinces and territories throughout Canada. Connect the principal energy resources in various provinces and territories to local weather patterns and natural environmental features.	Energy resources that are accessed directly include wood and biofuel. Energy resources that are accessed after processing include • wind • solar • fossil fuels • nuclear • hydro	Energy resources can be accessed either directly or after processing.	Classify energy resources as being used directly or after processing. Identify ways energy resources can be processed.
	Renewable energy resources include • solar • wind • biomass • geothermal • tidal • hydro	Energy resources are renewable or non-renewable.	Compare renewable energy resources with non-renewable energy resources.	Daily needs and wants that require energy resources include • heating • cooling • lighting • cooking • transportation	Energy resources meet community or human daily needs and wants.	Identify ways energy resources meet community or human needs or wants, past and present. Construct a device that uses one energy resource to solve a problem or respond to a need.

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	Non-renewable energy resources include fossil fuels and nuclear energy.		Discuss and determine advantages and disadvantages of using renewable and non-renewable energy resources, including from economic, environmental, and climate change perspectives. Demonstrate appropriate use of scientific vocabulary when discussing energy resources.	• sound and video • communication		Follow safety protocols when working with tools, materials, and equipment.
				Energy use may have environmental or economic impacts, including human-caused (anthropogenic) climate change.	Energy resources are used in ways that have short- and long-term impacts.	Investigate short- and long-term impacts of the use of renewable and non-renewable energy resources.
				Responsible management of energy resources can include • minimal disruption of the natural environment • restoration of areas • waste management practices	Energy resources can be managed responsibly.	Examine conservation and the management of energy resources in various contexts.

	Grade 5			Grade 6		
Organizing Idea	Earth Systems: Understandings of the living world, Earth, and space are deepened through investigating natural systems and their interactions.					
Guiding Question	What is climate?			What factors affect climate?		
Learning Outcome	Students analyze climate and compare it to weather conditions.			Students investigate climate and describe the interactions between the Sun, water, air, and land.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Weather is the short-term conditions experienced in a region, including • temperature • wind speed and direction • amount of sunlight • precipitation • humidity • cloud cover Climate is the average weather patterns of a region or place over a period of 30 years.	Weather patterns over 30 years determine climate.	Distinguish climate from weather. Ask questions about the characteristics of local, national, and global weather conditions to determine climate.	Components of Earth's systems that interact to affect climate include • sunlight • water • air • land	Climate involves complex interactions between various components of Earth's systems.	Research the impacts that interactions between the Sun, water, air, and land have on climate.
	Climates are dependent on • geographical location • terrain • altitude • nearby bodies of water Types of climates include • tropical • dry • temperate • polar	Climates vary across regions.	Investigate key characteristics of tropical, dry, temperate, and polar climates, including temperature, precipitation, humidity, and wind. Describe the weather patterns that contribute to Alberta's climate.	Changes in climate can be caused by natural processes, including • volcanic eruptions • meteors • changes in the Sun's output • changes in orbits Changes in climate can be caused by human-made processes, including industrialization and pollution.	While climate is more stable than weather, it is also susceptible to change due to natural and human-made processes.	Explain how natural processes and human-made processes can contribute to climate change, including ice ages and global warming or cooling.
	Data used to determine climate includes average • temperature • wind speed • precipitation • humidity First Nations, Métis, and Inuit can bring long-term observations of climate for local context.	Climate can be identified by analyzing long-term data and observations.	Interpret data about climate represented in diagrams, maps, tables, or graphs. Identify similarities and differences between the Alberta climate and the climates of other Canadian provinces.	Climate change can affect • weather and extreme weather events • migration patterns • species extinction • glacier formation • water resources • forest fires • length of growing seasons Traditional ways of living off the land and hunting and gathering practices of First Nations, Métis, and Inuit communities have been impacted by climate change.	Climate change over time can affect land, people, plants, and animals in a variety of ways.	Research the effects of climate change on land, people, plants, and animals. Discuss how changes in practices, such as the timing of planting and harvesting, have been impacted by climate change. Research how climate change is affecting ways of living in northern, Inuit, and/or coastal communities in Canada. Identify how climate change is affecting traditional ways of living off the land.

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						Propose ideas that will help humans address climate change in Canada and the world.
	Tools and methods to track weather conditions include • thermometers • wind vanes • windsocks • anemometers • barometers • rain or snow gauges • hygrometers Websites and weather apps improve access to reliable weather information. First Nations, Métis, and Inuit communities continue to rely on traditional knowledge to interpret and predict weather patterns.	Weather conditions, within any climate, are measured and tracked using a variety of tools and methods.	Construct simple weather instruments, such as • a wind vane • a rain gauge • a thermometer • a barometer • an anemometer Record local weather, including temperature, wind speed and direction, amount of sunlight, precipitation, relative humidity, and cloud cover, for a given time interval using scientific tools and methods. Represent local weather data using a journal, tables, charts, diagrams, or graphs. Construct a sample weather map for a local region, indicating the temperature, wind speed and direction, precipitation, and cloud cover at a given time.	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. Climate change can be identified through long-term observation and measurement of environmental conditions, including • sea and ocean levels • thickness and duration of sea ice • permafrost changes • number of forest fires • changes in the gases found in the air Climate observations can come from • recorded information • oral narratives • surface layers, including ice, from different time periods on Earth	Identifying changes in climate relies on observations from different points in time.	Compare historical observations and measurements of weather and environmental conditions to current data.
	Climate affects various aspects of human activity, including • agriculture • infrastructure • clothing • transportation • recreation Climate affects various aspects of animal activity, including • migration patterns • diet • timing of having offspring (reproduction)	Climate has an effect on human and animal activity.	Explain how climate can influence human and animal activity.	Location factors that affect climate include • latitude • proximity to a large body of water • elevation • landforms • urban or rural	Climate is dependent on location.	Compare and contrast the climate of selected Canadian cities or provinces based on their location.
	Conservation agriculture practices include • minimally disturbing soil • maintaining soil covers • rotating crops	Climate has an effect on agricultural practices.	Relate plants and animals commonly used in Alberta agriculture production to climate.	Technologies used to predict extreme weather events include radars, weather satellites, and computer modelling.	Extreme weather events are related to location and climate.	Relate extreme weather conditions to specific locations in Canada and on Earth. Research technologies that can be used to track and predict extreme weather events.

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	Conservation agriculture is a sustainable agriculture practice adapted to the requirements of the plants and animals being farmed and the local climate and environment of each region. First Nations, Métis, and Inuit practise sustainable harvesting and protocols.		Research how agricultural production, including agro-pastoral practices, contributes to daily life in Alberta. Investigate how conservation is used in agricultural practice for the protection and maintenance of land. Explain how First Nations, Métis, or Inuit practices relate to sustainable harvesting and protocols.	Technologies are emerging that allow for improved tracking and prediction of extreme weather events.		
	Methods used to predict weather include • computer modelling • historical data • satellite imaging • traditional knowledge	Predictions of weather are very complex and are attempted using a variety of methods.	Explain the importance of weather forecasts. Investigate how computer modelling, historical data, satellite imaging, and traditional knowledge are used to predict the weather.	Climate change programs continue to foster relations between Indigenous and northern communities to work alongside the government.	Collaboration between scientists and traditional Knowledge Keepers provides a broader understanding of the effects of weather on people and the environment. Traditional knowledge and modern technologies both provide information on long-term climate changes.	Discuss how scientists and traditional Knowledge Keepers can collaborate to develop deeper understandings of the effects of weather on people and the environment. Propose ideas on how local traditional Knowledge Keepers and the scientific community can collaborate to support understanding of local climate and climate change.
	Observations of weather conditions and animal behaviour can be used to recognize patterns and cycles. Patterns and cycles can be used to predict weather conditions.	Intergenerational observations and accounts of place have enabled individuals and communities to recognize patterns and cycles related to weather and seasons.	Examine how weather patterns and cycles can be used to predict weather conditions and animal behaviour.			

	Grade 5			Grade 6		
Organizing Idea	Living Systems: Understandings of the living world, Earth, and space are deepened through investigating natural systems and their interactions.					
Guiding Question	How are organisms supported by biological processes and systems?			What are ecosystems?		
Learning Outcome	Students investigate the internal systems of organisms and explain how they support biological processes.			Students investigate the characteristics and components of ecosystems and the impact of human activity.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Complex organisms, including plants and animals, are made up of systems, and these systems are made up of organs. Complex organisms evolved over time from simpler organisms.	Organisms range in complexity. Evolution over long periods of time leads to increasing complexity of organisms.	Relate organisms, systems, and organs to each other. Explain that complex organisms evolve over time from simpler organisms.	Biotic components of an ecosystem include plants, animals, and micro-organisms. Abiotic components of an ecosystem include • the Sun • water • soil • air • temperature	Ecosystems are complex systems of biotic and abiotic components. All components of an ecosystem depend on each other either directly or indirectly.	Represent the connections between components of an ecosystem by recording observations using words, tables, graphs, diagrams, photographs, or other representations.
	Vital biological processes of organisms (plants and animals) include • movement • nutrition • respiration • growth • reproduction	A complex organism, such as a plant or an animal, is a form of life composed of interdependent systems that maintain vital biological processes.	Make connections between biological processes. Describe the interdependence of biological processes.	Types of ecosystems include • desert • arctic • grassland • forest • tundra • freshwater • marine • alpine Characteristics of ecosystems include • climate patterns • size • vegetation structure • animal populations • geographic location	Each ecosystem has specific components and characteristics.	Locate and responsibly examine an ecosystem in nature. Practise safe and appropriate use of materials and digital or non-digital tools, including still image, video recording, and magnifying devices, while physically examining a local ecosystem. Identify characteristics of a chosen ecosystem and represent them using a model. Identify similarities and differences between two ecosystems.
	Human biological systems include • digestive system • respiratory system • circulatory system • musculoskeletal system	Humans are organisms with systems that serve various functions.	Research the function of the human digestive, respiratory, circulatory, and musculoskeletal systems. Identify ways the digestive, respiratory, and circulatory systems work together to move oxygen and nutrients throughout the human body.	Characteristics of ecosystems that affect diversity of organisms include • geographic location, including climate patterns, topography, and water • size, from very small to very large • complexity, including number and type of plant and animal species	The characteristics of an ecosystem affect the diversity of the organisms that live in it.	Analyze diversity of animals and plants in various ecosystems.

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	The digestive system is a human biological system that includes the mouth, stomach, intestines, liver, and pancreas. The respiratory system is a human biological system that includes the trachea, lungs, and diaphragm. The circulatory system is a human biological system that includes the heart and blood vessels. The musculoskeletal system is a human biological system that includes muscles and bones.	Organs are structures in the human body that perform a specific function.	Identify the digestive, respiratory, circulatory, and musculoskeletal systems of the human body and their major organs as represented in diagrams or models. Create a simple diagram or model of a human body system and label the major organs.	Plants play a variety of roles in an ecosystem, including • photosynthesis • cleaning and filtering water • preventing soil erosion • providing food and shelter for animals Humans use plants in various ways, including • production of oxygen • food • clothing • paper • building materials • medicine • fuel • shade from the Sun Certain plants, such as sage, sweetgrass, cedar, and tobacco, are considered sacred to First Nations and Métis. The offering of tobacco signifies • relationships with the plant • giving back to the land • respect for the plant • a sustainable relationship	Plants play an essential role in an ecosystem. Plants are used to meet human needs.	Research the importance of plants in an ecosystem. Identify how plants are used to meet human needs.
	Xylem and phloem in plants perform similar functions to the circulatory system in animals: • Xylem transports water and nutrients from the roots to the rest of the plant. • Phloem transports sugars from the leaves to the rest of the plant.	Plants have transport systems, including xylem and phloem.	Examine the transport systems of plants and describe their function.	The process of photosynthesis produces food in the form of sugar (glucose) and oxygen. Food produced by photosynthesis can be used by plants and algae to perform vital biological processes. Food produced by photosynthesis can be digested by animals when they consume plants. Oxygen released by plants during photosynthesis is used in respiration by animals. The following are required for photosynthesis to occur: • chlorophyll • light energy • water • carbon dioxide • nutrients	Photosynthesis is essential to maintain many ecosystems.	Explain the process of photosynthesis and its importance in an ecosystem.

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				The release of oxygen and the presence of starch prove that a plant has been photosynthesizing. Sugar produced by plants through photosynthesis is stored as starch. Iodine can be used to indicate the presence of starch.	Tests can be performed to determine if a plant has been photosynthesizing.	Design a simple experiment to demonstrate the importance of light energy to photosynthesis. Design a simple experiment to show a plant is releasing gas. Design a simple experiment to show a plant contains starch.

	Grade 5			Grade 6		
Organizing Idea	Space: Understandings of the living world, Earth, and space are deepened through investigating natural systems and their interactions.					
Guiding Question	How are astronomical phenomena observed and interpreted?			What is the solar system?		
Learning Outcome	Students investigate astronomical phenomena and various interpretations and understandings.			Students represent and compare the components of the solar system.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Astronomical phenomena include • seasonal changes • length of daylight • Moon phases • lunar and solar eclipses • lights (auroras) Seasons are experienced during different months of the year in the northern and southern hemispheres of Earth because these regions of Earth are tilted toward the Sun at different times of the year. Longer and shorter days are experienced during different months of the year in the northern and southern hemispheres of Earth because these regions of Earth are tilted toward the Sun at different times of the year. In Canada, auroras that are visible from Earth are referred to as the northern lights (aurora borealis).	Astronomical phenomena include the observable processes that happen among stars, planets, the Sun, and the Moon.	Relate experiences of seasons and length of daylight to the tilt of Earth on its axis. Describe personal observations related to cyclical changes in the Moon's appearance. Discuss observable features of lunar and solar eclipses. Research the cause of auroras.	Components of the solar system include • a star (the Sun) • planets and their moons • dwarf planets • asteroids • comets • dust • gases	The solar system is a complex system with many components.	Investigate the components of the solar system. Name the eight planets in the solar system. Discuss why Pluto was reclassified as a dwarf planet.
	Patterns and cycles of astronomical phenomena include • Moon phases • seasons • eclipses • comets • equinoxes and solstices • solar activity • meteor showers For First Nations, Métis, and Inuit, significant events and ways of living are connected to many astronomical phenomena.	Astronomical phenomena can have predictable patterns and cycles. Predictable astronomical phenomena are connected to ways of living.	Identify astronomical phenomena that occur cyclically. Research how Indigenous understandings of phases and cycles within astronomical phenomena inform ways of living and community activities. Explore Inuit or northern First Nations' stories related to the midnight sun, the polar night, and the northern lights.	Celestial bodies are natural bodies located beyond Earth's atmosphere, including • stars • planets • dwarf planets • moons • asteroids • comets Celestial bodies vary in many ways, including composition, temperature, and shape. Some celestial bodies emit light and others reflect light.	Celestial bodies can be identified according to characteristics and surface conditions.	Describe the characteristics and surface conditions of celestial bodies in our solar system, including planets, asteroids, and comets.

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	Astronomical phenomena can be represented using • calendars • cycles • stories and legends • artifacts	Astronomical phenomena can be represented in various ways that connect to daily life.	Research how Indigenous peoples represent astronomical phenomena, past and present. Connect various Indigenous and diverse representations, past and present, to astronomical phenomena. Relate lunar calendars, stories, artifacts, and cycles to the international standard calendar.	Technologies that are used to explore the solar system include • telescopes • satellites • probes • rovers • manned spacecraft and space stations • computer modelling Satellites are objects in space that orbit around another larger object. Natural satellites are celestial bodies. Artificial satellites are constructed and put into orbit by humans. 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 (ISS) in 2017. The International Space Station (ISS) is a research facility that orbits Earth.	The solar system is understood through the use of a variety of technologies. Knowledge of the solar system continues to develop with further space exploration and discovery.	Identify technologies and procedures used to gather knowledge about planets and other objects in space. Identify similarities and differences between natural satellites and artificial satellites, including Earth, the Moon, the Hubble Space Telescope, and the International Space Station (ISS). Discuss potential personal, societal, technological, and environmental barriers to living and working in space.
	Observations and interpretations of astronomical phenomena can be applied in various contexts, including • planting and harvesting of crops • hunting • predicting significant events • navigating	Observations and interpretations of astronomical phenomena can be applied to daily living in various ways.	Identify how observation of the night sky can determine agricultural practices, predict significant events, or aid navigation.	Models of the solar system include the Sun and the eight planets.	The solar system can be modelled to represent the size of components and the distance between them.	Identify components of the solar system represented in physical, pictorial, or digital models. Investigate and share digital or non-digital resources that contribute to understandings of the solar system.

	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?			How is design and abstraction used in computational thinking?		
Learning Outcome	Students create and justify a design that could be used by a human or machine to address a challenge.			Students create and refine computational artifacts through the use of design and abstraction.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	A computational artifact is anything created by a human using a computer, including • computer programs • images • audio • video • presentations • web pages	Design can be used to create computational artifacts.	Engage in the design process to create computational artifacts.	The process of abstraction is the reducing, filtering, or removing of unnecessary information. Abstraction includes • determining what to keep and what to ignore • removing unnecessary detail • identifying important information • generalizing patterns	Abstraction is used in design to make problems or systems easier to think about.	Apply abstraction during the design process.
	Code is any language that can be understood by and run on a computer. There are many ways to code, including visual block-based languages and simple and complex coding languages. Visual block-based languages (VBBL) are a form of code in which prepared chunks of instructions are in drag-and-drop blocks that can be fit together like puzzle pieces to design a program. A block is a single section of code. A computer cannot think for itself and must rely on code for all that it does.	In coding, design is used to create and translate algorithms into a language understood and run by a computer.	Relate a block of code to an outcome or a behaviour. Predict and explain what will happen when single or multiple blocks of code are executed. Translate a given algorithm to block-based code.	An abstraction is a simplified version of something complex. Abstractions that make daily life easier include • simple controls on appliances • light switches • steering wheels • apps	Abstractions used in technology make daily tasks easier to understand and perform.	Identify examples of abstractions encountered in daily life.
	A loop is a repetition of instructions used in an algorithm.	In coding, a loop can be designed to simplify a program.	Design an algorithm that includes a simple loop. Use a visual block-based coding language to write a computer program that includes a loop.	Examples of computational artifacts designed to address societal needs and wants include • weather modelling • communication • automotive control • medical research • online shopping and scheduling • computer games • apps	Computational artifacts are designed to address societal needs and wants.	Discuss the role of design and coding in society, including career opportunities.

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	Factors that may be considered in design include • function • usability • reliability • efficiency • aesthetics • safety • environmental needs	The context of the design problem influences which factors are considered in designing a solution.	Discuss examples of scientific, technological, and engineering designs that address a challenge. Determine relevant factors of designs that address a challenge. Decide which factors should be considered in the design of a specific physical or computational artifact.	Structures used in coding include • sequence • conditionals (e.g., if … then) • loops • true/false variables • operators such as *and, or,* and *not*	Coding requires the use of specific structures in the design.	Use a visual block-based coding language to design code that includes relevant design structures.
	The iterative process of design involves • building • testing • enhancing • refining • repeating	Design can be improved through the development of multiple iterations.	Develop design solutions through testing, refining, and enhancing using multiple iterations.	Literacy skills applied in coding include using precise language and following grammar rules. Numeracy skills applied in coding include sequencing, recognizing patterns, and understanding variables.	Designing code requires the application of literacy and numeracy skills.	Apply relevant literacy and numeracy skills when designing code. Explain how literacy and numeracy skills are significant to coding.
	Examples of designs that have changed to better meet desired needs or goals include • cars • cellphones • computers • kitchen appliances • medical technologies • clothing	Design changes can improve function, safety, or aesthetics to be more suitable for desired needs or goals.	Evaluate products, services, and computational artifacts according to criteria for success.	The use of computers, coding, and technology can have impacts that are • personal • social • environmental • economic Negative impacts of computers, coding, or technology may be intentional or unintentional.	Computers, coding, and technology can be used in ways that have positive or negative impacts.	Research how computers, coding, or technology have been used in ways that have had positive impacts. Communicate potential personal, social, environmental, or economic impacts that computers, coding, or technology could have. Identify situations in which computers, coding, or technology have had negative impacts.
	Computer scientists often work in teams to collaboratively solve design problems.	Design can be improved through collaboration.	Engage in collaborative processes and describe how design is enhanced by sharing ideas. Organize and perform strategic roles within a group to solve a design problem.			

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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	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 and objectivity in science.			Students investigate and describe the role of explanation in science.		
	Knowledge	Understanding	Skills and Procedures	Knowledge	Understanding	Skills and Procedures
	Observable and measurable phenomena can be perceived using the human senses. Phenomena that cannot be directly observed using the human senses can be made observable and measurable with the use of technologies, devices, and instruments, including • telescopes • microscopes • UV sensors • thermal image cameras • ultrasound • X-rays	Evidence in science can only be gathered by studying things that are observable and measurable.	Determine if evidence meets the scientific requirement of describing observable and measurable phenomena. Discuss specific areas of science where technology has provided scientists with evidence that cannot be directly observed using the human senses.	Scientific explanations must be testable (falsifiable). Testable explanations can be contradicted by evidence.	Scientific explanations are answers to scientific questions.	Discuss the role of scientific explanations.
	Bias is any preconceived thoughts, feelings, or expectations that influence an investigation. Bias affects the trustworthiness of evidence and can lead to false conclusions. Humans are not usually aware of their personal biases. Scientific methods attempt to remove bias to ensure objectivity.	Science requires evidence and conclusions to be free from bias.	Determine if evidence and conclusions are free from bias. Choose investigational methods that remove the potential for human biases.	Scientific explanations make sense of natural phenomena by identifying relationships between natural phenomena, including cause and effect.	Scientific explanations are statements that aim to make sense of natural phenomena.	Research and share examples of scientific explanations that make sense of natural phenomena. Use evidence to evaluate explanations of cause and effect related to natural phenomena.
	The variable that is changed is called the manipulated or independent variable. What happens in response to the variable that is changed is called the responding or dependent variable. The responding or dependent variable is what is observed or measured as evidence.	Variables are factors that can be controlled, changed, or measured in an experiment to develop evidence.	Define manipulated/independent and responding/dependent variables.	Hypotheses are based on prior scientific knowledge and understandings.	Hypotheses are proposed scientific explanations that are developed prior to conducting an investigation.	Develop a hypothesis before conducting a simple investigation.

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	A controlled experiment is a scientific experiment that is done using a specific method to remove human biases and expectations from the data and results. In a controlled experiment, only one manipulated/independent variable can be changed at a time and all others are kept the same. In a controlled experiment, there is a control group and one or more variable groups. The control group has all variables controlled and the variable group(s) differ in one manipulated/independent variable only. The control group in which nothing has been changed will be compared to the variable group(s).	Scientific evidence can be collected using controlled experiments to determine cause and effect.	Plan and conduct a simple controlled experiment. Identify the variables in a simple controlled experiment. Evaluate the effect of the manipulated variable on the responding variable. Defend a conclusion about cause and effect based on evidence gathered in a simple controlled experiment.	Data used in scientific explanations includes observations or measurements gathered using scientific methods. Evidence used in scientific explanations includes findings from analyzing observations and measurements used to support or contradict a hypothesis. Explanations should be constructed using reliable, objective data and evidence. Only scientific experiments performed with objectivity and a high level of accuracy produce trustworthy evidence to support explanations. Not all scientific experiments are completed with the same level of objectivity and accuracy.	Scientific explanations are based on data and evidence.	Create scientific explanations using observations and measurements to explain how natural phenomena occur. Discuss observations and measurements that were used to create scientific explanations. Evaluate the trustworthiness of evidence and explanations from a variety of sources.
	Factors that affect the quality of data include • sources and amount of data collected • procedures used for collecting and analyzing data • the reliability, validity, accuracy, and reproducibility of experiments • manipulated and responding variables	The strength of evidence depends on the quality of data collected during a scientific investigation.	Evaluate the strength of evidence based on the origin and quality of data collected. Apply suitable methods to record, compile, interpret, and evaluate observations and measurements.	Scientists communicate evidence and explanations differently to the public than to the scientific community. Scientists communicate data, evidence, and explanations to the public through • graphs, tables, flow charts, diagrams • formulas • models • role plays • films • maps Scientists communicate data, evidence, and explanations to the scientific community through • research papers • conferences • graphs, tables, flow charts, diagrams • formulas • models • maps	Representations of data and evidence enhance scientific understanding and explanation.	Communicate ideas, explanations, and processes using various representations, including appropriate technologies. Construct graphs and tables using proper labels, legends, scales, and titles. Interpret various representations of data and evidence to explain natural phenomena. Compare and refine explanations based on an evaluation of the evidence presented. Determine the appropriateness of methods of communicating data, evidence, and explanations based on the audience.

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	Scientific ethics include honesty, openness, respect, fairness, and accountability. Ethics includes minimizing harm to animals, protecting human participants, and informing human participants of any potential risks.	Evidence needs to be gathered, handled, and shared responsibly and ethically.	Examine the importance of scientists gathering, handling, and sharing evidence responsibly and ethically. Choose appropriate measurement methods to record data accurately and honestly. Responsibly gather, analyze, and present data to communicate information.	Background knowledge important to understanding explanations could include scientific vocabulary, methods, concepts, and ideas.	Background knowledge may be required to understand explanations in science.	Determine the background knowledge required to understand a scientific explanation.
	Clear, accurate, and honest communication of evidence must • use correct vocabulary • include all relevant data • be free from personal bias • be understood by the intended audience	Evidence must be communicated clearly and accurately.	Identify examples of inaccurate or unclear communication of evidence and evaluate the potential impact. Use scientific vocabulary in various contexts.	Ways to share explanations of natural events include • written texts • traditional knowledge • visual forms • verbal presentations • stories and legends	Explanations of natural events and phenomena have historically been and continue to be shared in various ways.	Compare and contrast multiple forms of text that offer explanations of natural events and phenomena.
	Some representations summarize all the data and some communicate only part of the data.	Various representations of data communicate evidence differently.	Determine if representations of data accurately represent and communicate evidence. Discuss the benefits of diverse representations of data and evidence.	Evidence and scientific explanations are subject to further investigation to determine their validity. Further investigation can include • continual collection of evidence over time • discussion and debate in the scientific community • multiple investigations over long periods of time • replication of investigation by other scientists • new technologies and methods revealing new evidence • analysis of the scientific methods that were used Evidence that seems to contradict scientific explanations requires further investigation to determine its validity. One conflicting study is not enough to cause a scientific explanation to be revised.	Science is a self-correcting way of knowing about the world, where new evidence can change understandings and explanations.	Explain why evidence is subject to further investigation. Identify methods that can be used to validate evidence and explanations. Discuss the importance of collecting evidence from multiple studies over long periods of time. Describe how discussing and debating evidence from investigations can enhance scientific knowledge of natural phenomena. Research how explanations of natural phenomena have been refined as new evidence has been revealed. Explain the process that occurs when contradictory evidence is revealed.