GRADE **2**

GRADE 2 | UNDERSTANDING LIFE SYSTEMS
GROWTH AND CHANGES IN ANIMALS

OVERVIEW

Growth and Changes in Animals focuses on investigating the distinct characteristics of animals related to appearance, behaviour, growth, and change. Students will study a variety of animals and identify important similarities and differences among them. As well as making the obvious physical comparisons, students will look at ways in which human activities have an impact on specific animals and their survival, and ways in which the animals' environment has an impact on their development. They will also examine the importance of animals and the need for humans to protect animals and the places where they live.

This topic provides opportunities for students to observe live animals. Caring for them in the classroom, even for short periods of time, helps students to learn about their needs and characteristics. It also helps to foster concern and respect for living things. Teachers should respect the fact that some students may not wish to handle or pet animals, for personal or religious reasons. It is important that students be able to identify practices that ensure their own personal safety and the safety of others and demonstrate an understanding of these practices. This includes knowing why it is important to make the teacher aware of any allergies to animal fur and/or dander, to wash their hands before and after handling animals, and to properly clean and maintain the animals' housing.

Fundamental Concepts	Big Ideas
Structure and Function Sustainability and Stewardship	Animals have distinct characteristics. *(Overall expectations 2 and 3)* Humans are animals. *(Overall expectations 1, 2, and 3)* There are similarities and differences among different kinds of animals. *(Overall expectation 2)* Humans need to protect animals and the places where they live. *(Overall expectation 1)*

OVERALL EXPECTATIONS

By the end of Grade 2, students will:

1. assess ways in which animals have an impact on society and the environment, and ways in which humans have an impact upon animals and the places where they live;
2. investigate similarities and differences in the characteristics of various animals;
3. demonstrate an understanding that animals grow and change and have distinct characteristics.

SPECIFIC EXPECTATIONS

1. Relating Science and Technology to Society and the Environment

By the end of Grade 2, students will:

1.1 identify positive and negative impacts that animals have on humans (society) and the environment, form an opinion about one of them, and suggest ways in which the impact can be minimized or enhanced

Sample prompts: Because interacting with dogs can have a calming effect on humans (e.g., lowering blood pressure and relieving tension), dog visits are used in hospitals and retirement homes as therapy for the patients/residents. Dogs and monkeys can be trained to be the eyes and ears of visually and hearing impaired people. Birds can destroy crops such as blueberries and apples.

1.2 identify positive and negative impacts that different kinds of human activity have on animals and where they live *(e.g., actions of animal lovers and groups that protect animals and their rights, the home owner who wants a nice lawn, people who visit zoos and wildlife parks, pet owners)*, form an opinion about one of them, and suggest ways in which the impact can be minimized or enhanced

Sample prompts: Humans try to protect endangered and/or sensitive species by minimizing pollution and protecting the places where they live. Humans raise a variety of animals on farms, for food. Humans use pesticides on their lawns and gardens and to kill insects such as black flies and mosquitos. Humans use lands where animals live to build houses for themselves. Humans take animals, some of which may be endangered, from the wild and put them in zoos. Humans use animal skin and fur for clothing, for furniture, and for decoration. Humans create animal shelters for unwanted pets. Humans provide protected parks or wildlife reserves as special places for animals to live.

2. Developing Investigation and Communication Skills

By the end of Grade 2, students will:

2.1 follow established safety procedures and humane practices specific to the care and handling of live animals, where appropriate, during science and technology investigations *(e.g., make the teacher aware of any allergies; handle animals gently or know when it is better not to handle them at all; wash hands after handling animals)*

2.2 observe and compare the physical characteristics *(e.g., fur or feathers; two legs or no legs)* and the behavioural characteristics *(e.g., predator or prey)* of a variety of animals, including insects, using student-generated questions and a variety of methods and resources *(e.g., observation of live animals in the schoolyard; books, videos/DVDs, CD-ROMs, and/or Internet sources that depict animals in a positive light)*

2.3 investigate the life cycle of a variety of animals *(e.g., butterflies, frogs, chickens)*, using a variety of methods and resources *(e.g., observation of live animals in the classroom and in the schoolyard; books, videos/DVDs, CD-ROMs, and/or the Internet)*

2.4 observe and compare changes in the appearance and activity of animals as they go through a complete life cycle *(e.g., frog, butterfly)*

2.5 investigate the ways in which a variety of animals adapt to their environment and/or to changes in their environment, using various methods *(e.g., read simple non-fiction texts and Aboriginal stories; observe animal activity in the schoolyard and surrounding areas, and record findings)*

2.6 use scientific inquiry/research skills (see page 15), and knowledge acquired from previous investigations, to investigate the basic needs, characteristics, behaviour, and adaptations of an animal of their choice

2.7 use appropriate science and technology vocabulary, including *life cycle*, *migration*, *adaptation*, *body coverings*, and *classify*, in oral and written communication

2.8 use a variety of forms *(e.g., oral, written, graphic, multimedia)* to communicate with different audiences and for a variety of purposes *(e.g., use a model constructed of modelling clay and a tree branch to explain how a caterpillar feeds)*

3. Understanding Basic Concepts

By the end of Grade 2, students will:

3.1 identify and describe major physical characteristics of different types of animals *(e.g., insects, mammals, reptiles)*

3.2 describe an adaptation as a characteristic body part, shape, or behaviour that helps a plant or animal survive in its environment *(e.g., some birds migrate to a warmer climate for the winter; the design of a whale's flipper allows the whale to turn, steer, and balance; the cecropia moth has the pattern of a snake's head on its wings: the hypothesis is that this is to frighten its predators away)*

3.3 identify ways in which animals are helpful to, and ways in which they meet the needs of, living things, including humans, to explain why humans should protect animals and the places where they live *(e.g., bats control mosquito populations; birds and wildlife provide pleasurable viewing experiences; the buffalo provided some Aboriginal people with everything they needed to survive: food, shelter, clothing, tools, ornamentation, and weapons; horses can be used for labour; cats and dogs provide companionship for humans; animals, including humans, disperse plant seeds)*

3.4 identify ways in which animals can be harmful to humans *(e.g., some people have an allergic reaction to bee and wasp venom when they are stung; deer, moose, and bears on roads can pose a hazard to people driving at night)*

GRADE 2 | UNDERSTANDING STRUCTURES AND MECHANISMS
MOVEMENT

OVERVIEW

The study of moving things helps students develop both a sense of spatial relationships and an understanding of the relationship between stationary and moving objects. Students will learn about the basic nature of movement as a change in position of an object. They will learn about the six basic types of simple machines (lever; inclined plane; pulley; wheel and axle, including gear; screw; wedge), and how they help humans to move objects. They will also learn that mechanisms are moving parts that incorporate simple machines for changing the type and direction of movement and that mechanisms and machines help make our lives easier and/or more enjoyable. It is necessary for teachers to provide opportunities for students with special education needs to participate in design-and-build, or comparable, activities.

As students design, build, and test their mechanisms, it is important that they do so in a manner that ensures their personal safety and the safety of others. This includes understanding why it is important to use the appropriate tools for a task (e.g., a paper punch or paper drill for making holes for wheels and axles), and why they should not put small objects such as wood fragments into their ears or nose.

Fundamental Concepts	Big Ideas
Structure and Function Energy	Movement is a change in position of an object. *(Overall expectations 2 and 3)* Simple machines help objects to move. *(Overall expectations 1, 2, and 3)* Mechanisms are made up of one or more simple machines. *(Overall expectation 2)* Simple machines and mechanisms make life easier and/or more enjoyable for humans. *(Overall expectation 1)*

OVERALL EXPECTATIONS

By the end of Grade 2, students will:

1. assess the impact on society and the environment of simple machines and mechanisms;
2. investigate mechanisms that include simple machines and enable movement;
3. demonstrate an understanding of movement and ways in which simple machines help to move objects.

SPECIFIC EXPECTATIONS

1. Relating Science and Technology to Society and the Environment

By the end of Grade 2, students will:

1.1 assess the impact on society and the environment of simple machines that allow movement

Sample prompts: Some simple machines add enjoyment to our lives (e.g., the wheel and axle on devices such as skateboards, the lever on devices such as teeter totters and the keys on a piano). Common mechanisms and simple machines make it easier to carry out tasks that require movement because less force is needed (e.g., using a pulley makes it easier to lift a load), and make it possible for people with disabilities to lead a more active life (e.g., using a wheelchair allows people with disabilities to be more independent; using a ramp allows people in wheelchairs to move from one level to another). The use of simple machines to make life easier has created a more sedentary lifestyle that has created health problems for many humans. Some mechanisms use a lot of energy and pollute the air and water. Some mechanisms are a source of danger to humans and animals.

2. Developing Investigation and Communication Skills

By the end of Grade 2, students will:

2.1 follow established safety procedures during science and technology investigations *(e.g., return tools to their designated area when they are done with them; carry tools and materials safely)*

2.2 investigate and describe different kinds of movement *(e.g., by observing how toys and other everyday objects move)*

2.3 investigate the structure and function of simple machines *(e.g., by building a wheel and axle for a toy car; by exploring the effects of changing the slope of a ramp)*

2.4 use technological problem-solving skills (see page 16), and knowledge and skills acquired from previous investigations, to design, build, and test a mechanism that includes one or more simple machines *(e.g., a toy, a model vehicle)*

Sample guiding questions: What is the purpose of your mechanism? What simple machine(s) does it use? Explain how it does what it does. What kind of movement does it demonstrate? What were some of the challenges in designing and making your mechanism? Based on the tests you conducted, what might you change about your mechanism?

2.5 use appropriate science and technology vocabulary, including *push, pull, beside, above, wheel, axle,* and *inclined plane,* in oral and written communication

2.6 use a variety of forms *(e.g., oral, written, graphic, multimedia)* to communicate with different audiences and for a variety of purposes *(e.g., orally explain to the class the process they followed in building a mechanism that includes one or more simple machines)*

3. Understanding Basic Concepts

By the end of Grade 2, students will:

3.1 describe different ways in which objects move *(e.g., turning, spinning, swinging, bouncing, vibrating, rolling)*

3.2 identify ways in which the position of an object can be changed *(e.g., by pushing, by pulling, by dropping)*

3.3 identify the six basic types of simple machines – lever; inclined plane; pulley; wheel and axle, including gear; screw; and wedge – and give examples of ways in which each is used in daily life to make tasks easier

3.4 describe how each type of simple machine allows humans to move objects with less force than otherwise would be needed *(e.g., an inclined plane allows a heavy object to be moved upwards more easily than if it were lifted and carried up stairs; a wheel and axle allow an object to roll, which creates less friction than if it were dragged; a lever activated by a piano key strikes [pushes] a string, which vibrates to make a sound)*

3.5 identify simple machines used in devices that move people *(e.g., the wheel and axle on a bicycle or a car; the pulleys on an elevator; the inclined planes of moving ramps in parking garages and malls)*

GRADE 2 | UNDERSTANDING MATTER AND ENERGY
PROPERTIES OF LIQUIDS AND SOLIDS

OVERVIEW

When students examine materials in the world around them, they become aware of a wide variety of similarities and differences in the properties of those materials, including how they look, feel, and change. Students will develop their understanding of the properties of materials through investigating familiar liquid and solid materials, including the different ways in which liquids and solids interact and the various uses of liquid and solid materials.

When working with liquids and solids, it is important that students do so in a manner that ensures their personal safety and the safety of others. This includes understanding why they should never put any materials in their mouths unless told to do so by the teacher. Students should also understand why they should wash their hands after handling any materials.

Connections can also be made with the topic in the following strand – Air and Water in the Environment.

Fundamental Concepts	Big Ideas
Energy Matter	Materials that exist as liquids and solids have specific properties. *(Overall expectations 2 and 3)* Liquids and solids interact in different ways. *(Overall expectations 2 and 3)* Some liquids and solids can be harmful to us and the environment. *(Overall expectations 1 and 2)*

OVERALL EXPECTATIONS

By the end of Grade 2, students will:

1. assess ways in which the uses of liquids and solids can have an impact on society and the environment;
2. investigate the properties of and interactions among liquids and solids;
3. demonstrate an understanding of the properties of liquids and solids.

SPECIFIC EXPECTATIONS

1. Relating Science and Technology to Society and the Environment

By the end of Grade 2, students will:

1.1 assess the ways in which liquids and solids in the home are used, stored, and disposed of in terms of the effect on personal safety and the health of the environment, and suggest responsible actions to replace inappropriate practices

Sample prompts: Directions for the use of medicines and cleaning products should be followed carefully. Medicines should be used only by the person for whom they are prescribed. Cleaning products should be stored in the original container and kept out of reach of young children. Old paint and pesticides should be taken to an appropriate waste disposal depot.

1.2 assess the impacts of changes in state of solids and liquids on individuals and society

Sample prompts: Rain turns to sleet or freezing rain when the temperature near the ground is cold enough. Freezing rain makes walking and driving dangerous. If layers of ice build up on power lines, the lines can fall, leaving people without power to their homes. Tree branches coated with this ice can also fall.

2. Developing Investigation and Communication Skills

By the end of Grade 2, students will:

2.1 follow established safety procedures during science and technology investigations *(e.g., clean up spills as soon as they happen)*

2.2 investigate the properties of liquids *(e.g., conduct experiments to compare the rate at which different liquids flow)* and solids *(e.g., conduct experiments to find out ways in which solids can be changed)*

2.3 investigate, through experimentation, interactions that occur as a result of mixing and/or dissolving liquids and solids *(e.g., salt and water, sand and water),* liquids and liquids *(e.g., oil and water),* and solids and solids *(e.g., salt and sand)*

2.4 use scientific inquiry/experimentation skills (see page 12) to investigate liquids and solids in terms of their capacity for buoyancy *(e.g., wood floats, coins sink)* and/or absorption *(e.g., paper towel absorbs liquid, plastic wrap repels liquid)*

Sample guiding questions: What question are you trying to answer about buoyancy or absorption? What steps did you follow to carry out your experiment? What did you predict will happen? What did you find out? What conclusions can you make from this information? How might you share the things that you learned? How might someone use the information that you gathered from your experiments?

2.5 use technological problem-solving skills (see page 16), and knowledge acquired from previous investigations, to design, build, and test a structure that involves interactions between liquids and solids *(e.g., an object that floats)*

Sample guiding questions: What did you build? How does it use the properties of liquids and solids? What changes might you make based on the testing that you did on your object? Who might find this information useful?

2.6 use appropriate science and technology vocabulary, including *clear, opaque, runny, hard, greasy,* and *granular,* in oral and written communication

2.7 use a variety of forms *(e.g., oral, written, graphic, multimedia)* to communicate with different audiences and for a variety of purposes *(e.g., use a simple drawing program to write a booklet for the school library describing class experiments in investigating liquids and solids)*

3. Understanding Basic Concepts

By the end of Grade 2, students will:

3.1 identify objects in the natural and built environment as solids *(e.g., sand, ice, rocks, tables, sidewalks, walls)* or liquids *(e.g., water, tree sap, milk, gasoline)*

3.2 describe the properties of solids *(e.g., they maintain their shape and cannot be poured)* and liquids *(e.g., they take the shape of the container they are in and can be poured)*

3.3 describe the characteristics of liquid water *(e.g., it takes the shape of the container it is in)* and solid water *(e.g., ice floats),* and identify the conditions that cause changes from one to the other *(e.g., water turns to ice when the temperature goes below zero; ice turns to water when heated)*

3.4 identify conditions in which the states of liquids and solids remain constant *(e.g., solids remain solid when broken; liquids remain liquid when poured)* and conditions that can cause their states to change *(e.g., liquids may freeze when the temperature drops; solids may melt when heated)*

3.5 describe some ways in which solids and liquids can be combined to make useful substances *(e.g., flour and water make paste; milk and chocolate powder make chocolate milk)*

3.6 explain the meaning of international symbols that give us information on the safety of substances *(e.g., a skull-and-crossbones symbol means that the substance is poisonous; a flame inside a hexagon means that the substance is flammable)*

GRADE 2 | UNDERSTANDING EARTH AND SPACE SYSTEMS
AIR AND WATER IN THE ENVIRONMENT

OVERVIEW

Air and water form a major part of the environment and are essential materials for life. Through investigations, students will learn about the characteristics of air and the various forms of water in the environment, about changes in and interactions between air and water when they are heated and cooled, and about their movement through the environment. Students will also learn about the impact of human actions on the quality of air and water and about their responsibility for keeping air and water clean.

It is important that students investigate air and water in a manner that ensures their personal safety and the safety of others. This includes understanding why demonstrations involving heat (e.g., using a kettle) must always be done by the teacher, and why any objects that are propelled by air should always be directed away from other students.

Connections can also be made with the topic in the preceding strand – Properties of Liquids and Solids.

Fundamental Concepts	Big Ideas
Change and Continuity Sustainability and Stewardship	Air and water are a major part of the environment. *(Overall expectations 1, 2, and 3)* Living things need air and water to survive. *(Overall expectations 1 and 3)* Changes to air and water affect living things and the environment. *(Overall expectations 1 and 3)* Our actions affect the quality of air and water, and its ability to sustain life. *(Overall expectations 1, 2, and 3)*

OVERALL EXPECTATIONS

By the end of Grade 2, students will:

1. assess ways in which the actions of humans have an impact on the quality of air and water, and ways in which the quality of air and water has an impact on living things;
2. investigate the characteristics of air and water and the visible/invisible effects of and changes to air and/or water in the environment;
3. demonstrate an understanding of the ways in which air and water are used by living things to help them meet their basic needs.

SPECIFIC EXPECTATIONS

1. Relating Science and Technology to Society and the Environment

By the end of Grade 2, students will:

1.1 assess the impact of human activities on air and water in the environment, taking different points of view into consideration *(e.g., the point of view of parents, children, other community members)*, and plan a course of action to help keep the air and water in the local community clean

Sample prompts: "On the weekend, after my mom and I washed the car, we poured the soapy water down the drain at the corner of our street." "I wanted to walk with my dad to the library, but he wanted to drive because it is faster."

1.2 assess personal and family uses of water as responsible/efficient or wasteful, and create a plan to reduce the amount of water used, where possible

Sample prompts: Many people do not realize how much water they use, because it seems so easy to get water. We shouldn't waste water, for the same reasons that we shouldn't waste food – for example, because others don't have enough and it costs money. In what ways do you and your family use water at home (e.g., flushing the toilet, drinking, bathing, washing dishes, watering the lawn)? What does it mean to use water excessively? How might your use of water change if you had to carry it from a central source into your house or apartment? What responsible/efficient water-use practices does your family use already (e.g., fixing leaky faucets or toilets quickly; turning off the water while you brush your teeth or soap up your hands and face; watering the lawn early in the morning to reduce evaporation; running the dishwasher only with a full load)? What are some other strategies that you and your family might implement in the future (e.g., installing low-flow shower heads and a water-saver flush kit in the toilet; not splashing lots of water out of swimming pools; keeping a bottle of drinking water in the refrigerator rather than letting your tap run to get cold water when you want a drink)?

2. Developing Investigation and Communication Skills

By the end of Grade 2, students will:

2.1 follow established safety procedures during science and technology investigations *(e.g., use caution around hot kettles and the steam they produce; clean up water spills as soon as they happen)*

2.2 investigate, through experimentation, the characteristics of air *(e.g., air takes up space, has mass)* and its uses *(e.g., living things breathe air to stay alive; air makes certain activities possible: helps keep a kite flying and a sailboat moving)*

2.3 investigate, through experimentation, the characteristics of water *(e.g., water takes up space, flows or moves when not contained, has mass)* and its uses *(e.g., living things need water to stay alive; water makes things move: spins a water wheel; water makes certain activities possible: keeps a white-water raft afloat)*

2.4 investigate the stages of the water cycle, including evaporation *(e.g., heat water in a kettle)*, condensation *(e.g., collect the water vapour from the kettle on an overturned mirror)*, precipitation *(e.g., allow the water vapour on the overturned mirror to collect, cool, and drop)*, and collection *(e.g., let the dripping water accumulate in a container)*

2.5 investigate water in the natural environment *(e.g., observe and measure precipitation; observe and record cloud formations; observe water flow and describe where it goes; observe a puddle over time and record observations)*

Sample guiding questions: Where does the water come from? Where does it go? What happens to snow when it disappears? What do you notice about the sky when it is raining/snowing? How does fog feel?

2.6 use appropriate science and technology vocabulary, including *solid*, *liquid*, *vapour*, *evaporation*, *condensation*, and *precipitation*, in oral and written communication

2.7 use a variety of forms *(e.g., oral, written, graphic, multimedia)* to communicate with different audiences and for a variety of purposes *(e.g., create posters or media ads that encourage care and concern for water and air in the community)*

3. Understanding Basic Concepts

By the end of Grade 2, students will:

3.1 identify air as a gaseous substance that surrounds us and whose movement we feel as wind

3.2 identify water as a clear, colourless, odourless, tasteless liquid that exists in three states and that is necessary for the life of most animals and plants

3.3 describe ways in which living things, including humans, depend on air and water *(e.g., most animals, including humans breathe air to stay alive; wind generates energy, disperses seeds; all living things need to drink or absorb water to stay alive; water is used for washing and bathing, transportation, energy generation)*

3.4 identify sources of water in the natural and built environment *(e.g., natural: oceans, lakes, ponds, streams, springs, water tables; human-made: wells, sewers, water-supply systems, reservoirs, water towers)*

3.5 identify the three states of water in the environment, give examples of each *(e.g., solid – visible as ice, snow, sleet, hail, frost; liquid – visible as rain, dew; gas – visible as fog, water vapour)*, and show how they fit into the water cycle when the temperature of the surrounding environment changes *(e.g., heat – evaporation; cooling – condensation and precipitation)*

3.6 state reasons why clean water is an increasingly scarce resource in many parts of the world