

GRADE 1

GRADE 1 | UNDERSTANDING LIFE SYSTEMS NEEDS AND CHARACTERISTICS OF LIVING THINGS

OVERVIEW

Young children have an inherent curiosity about things in nature. This topic takes advantage of that curiosity by beginning a study of a variety of living things, including humans. The focus is on investigating the basic needs and characteristics of living things, observing their similarities and differences, and developing an understanding of their general characteristics. Students will discover that all living things have some similar needs, and many also have unique needs. Students will recognize that humans have a special responsibility for maintaining a healthy environment, so that they and other living things can continue to have their needs met by that environment. Students will learn why all living things are important and why they should be treated with care and respect. During discussions of human physical and sexual characteristics, care should be taken to ensure that a positive discussion takes place.

Grade 1 students have a natural tendency to ask questions and an increasing ability to solve problems. They benefit from having numerous opportunities to be outside exploring their schoolyard and surrounding natural areas, activities that can nourish their curiosity and help them develop a caring and respectful attitude towards all living things. Care must be taken to ensure that all students, including students with special education needs, have comparable opportunities to explore the natural world.

The study of plants and animals in Grade 1 presents very few hazards for young students. However, it is important that they be able to identify general practices that ensure their personal safety and the safety of others and to demonstrate an understanding of the importance of these practices. This includes knowing why it is important to wash their hands before and after handling animals, and why they should never put any part of a plant in their mouths unless under the direction of the teacher.

Connections can be made with another Grade 1 science and technology topic, Understanding Earth and Space Systems: Daily and Seasonal Changes, as students investigate how seasonal changes affect living things and recognize the importance of living things in our environment.

Fundamental Concepts	Big Ideas
Sustainability and Stewardship	<p>Living things grow, take in food to create energy, make waste, and reproduce. <i>(Overall expectations 2 and 3)</i></p> <p>Plants and animals, including people, are living things. <i>(Overall expectations 2 and 3)</i></p> <p>Living things have basic needs (air, water, food, and shelter) that are met from the environment. <i>(Overall expectations 1, 2, and 3)</i></p> <p>Different kinds of living things behave in different ways. <i>(Overall expectations 2 and 3)</i></p> <p>All living things are important and should be treated with care and respect. <i>(Overall expectations 1, 2, and 3)</i></p>

OVERALL EXPECTATIONS

By the end of Grade 1, students will:

1. assess the role of humans in maintaining a healthy environment;
2. investigate needs and characteristics of plants and animals, including humans;
3. demonstrate an understanding of the basic needs and characteristics of plants and animals, including humans.

SPECIFIC EXPECTATIONS

1. Relating Science and Technology to Society and the Environment

By the end of Grade 1, students will:

- 1.1 identify personal action that they themselves can take to help maintain a healthy environment for living things, including humans (*e.g., walk to school instead of being driven in the car; be careful what they put down the drain at home; practise cleanliness to reduce the spread of germs when helping in the kitchen; show care and concern for all living things*)

Sample guiding questions: What happens to humans when part of their environment is not healthy? What happens to other animals and plants when part of their environment is not healthy? What are some ways that humans help and hurt other living things? What can we do at home to help keep our environment healthy? What can we do here at school? What does our community do to help keep our environment healthy?

- 1.2 describe changes or problems that could result from the loss of some kinds of living things that are part of everyday life (*e.g., if we lost all the cows, all the insects, all the bats, all the trees, all the grasses*), taking different points of view into consideration (*e.g., the point of view of farmers, children, parents*)

Sample guiding questions: What are some living things that we see every day? Which are plants? Which are animals? What makes them important to us and to the environment? How would things be different for us as humans if there were no cows (trees, insects, bats, grass)? How would things be different for other living things? How would the environment be different? What are some things we can do to show that we care for other living things and appreciate what they do for us and for the environment?

2. Developing Investigation and Communication Skills

By the end of Grade 1, students will:

- 2.1 follow established safety procedures and humane practices during science and technology investigations (*e.g., show care and concern when handling animals*)
- 2.2 investigate and compare the basic needs of humans and other living things, including the need for air, water, food, warmth, and space, using a variety of methods and resources (*e.g., prior knowledge, personal experience, discussion, books, videos/DVDs, CD-ROMs*)

Sample guiding questions: What is the difference between living things and non-living things? What are some of the things that humans need to live and grow? What do other living things need to live and grow? In what ways are all living things alike? What are some ways in which they are different? In what ways might humans interfere with the ability of other living things to get what they need to live (*e.g., by polluting the water that animals drink and live in; by removing plants from their natural growing places and putting them in their gardens*)? Why do some Aboriginal people consider rocks to be living things?

- 2.3 investigate and compare the physical characteristics of a variety of plants and animals, including humans (*e.g., some plants produce flowers and some do not; most plants have roots; some animals have two legs, while others have four; all animals have sense organs*)
- 2.4 investigate the physical characteristics of plants (*e.g., basic parts, size, shape, colour*) and explain how they help the plant meet its basic needs (*e.g., roots anchor the plant and help provide the plant with food and water; some plants have brightly coloured flowers to attract bees*), using a variety of methods and resources

(e.g., *direct observation of live plants in the classroom and in the schoolyard, prior knowledge, personal experience, diagrams and/or charts*)

Sample guiding questions: What are the things that plants need in order to grow and survive? What parts do most plants have? How does each of these parts help the plant to get what it needs to grow and survive?

- 2.5 investigate characteristics of parts of the human body, including the five sense organs, and explain how those characteristics help humans meet their needs and explore the world around them (e.g., *our hands have fingers and a thumb that are flexible to allow us to pick up food; our legs have the two biggest bones in our bodies, to carry us around to do the things we need to do; our tongue has bumps that help us to determine if our food is too hot, too cold, or tastes bad; our ears are shaped like cones to catch sounds that warn us that danger is near and to hear the beautiful sounds of nature*), using a variety of methods and resources (e.g., *observation of themselves and other animals, outdoor experiences, prior knowledge, personal experience, diagrams and/or charts*)
- 2.6 use appropriate science and technology vocabulary, including **investigation**, **explore**, **needs**, **space**, and **food**, 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 a diorama to illustrate the basic needs of plants and animals, including humans*)
- 3.4 describe the characteristics of a healthy environment, including clean air and water and nutritious food, and explain why it is important for all living things to have a healthy environment
- 3.5 describe how showing care and respect for all living things helps to maintain a healthy environment (e.g., *leaving all living things in their natural environment; feeding birds during cold winter months; helping to plant and care for plants in the gardens that attract birds and butterflies; caring for the school and the schoolyard as an environment*)
- 3.6 identify what living things provide for other living things (e.g., *trees produce the oxygen that other living things breathe; plants such as tomatoes and apple trees and animals such as cows and fish provide food for humans and for other animals; a tree stump provides a home for a chipmunk; porcupines chew off the tips of hemlock limbs, providing food for deer in winter*)
- 3.7 describe how the things plants and animals use to meet their needs are changed by their use and are returned to the environment in different forms (e.g., *the food animals eat and the water they drink are returned to the earth as scat and urine*)

3. Understanding Basic Concepts

By the end of Grade 1, students will:

- 3.1 identify **environment** as the area in which something or someone exists or lives
- 3.2 identify the physical characteristics (e.g., **size**, **shape**, **colour**, **common parts**) of a variety of plants and animals (e.g., *sunflowers are tall, with a long stalk, leaves, and big, round, yellow flowers with hundreds of seeds; dogs can be big or small, come in many shapes and colours, have four legs, and usually have a tail and are covered with fur*)
- 3.3 identify the location and function of major parts of the human body, including sense organs (e.g., *lungs are in my chest and are used for breathing; teeth are in my mouth and are used for eating; hair is on my head for protection from the cold; ears are on the sides of my head and are used for hearing*)

GRADE 1 | UNDERSTANDING STRUCTURES AND MECHANISMS

MATERIALS, OBJECTS, AND EVERYDAY STRUCTURES

OVERVIEW

We are surrounded by a wide variety of common objects and structures that have distinctive shapes, patterns, and purposes. There are different categories of structures and different materials from which structures are made. This topic focuses on helping students to make the distinction between objects and materials through investigation of the observable characteristics of objects and the specific properties of the materials from which the objects are made. Students will learn that a structure is not only an object in itself but also the supporting framework that holds an object together. They will also investigate how the materials and structure of an object determine its purpose and how choices of materials for objects and structures have a direct effect on the environment.

For students in Grade 1, things are either right or wrong, good or bad, with little middle ground. This is a good time to begin to ask them to consider viewpoints other than their own. Asking them to think about the issue of classroom waste from the point of view of the people most directly involved can help them to see that every issue has several perspectives.

In their explorations of materials and objects, students in Grade 1 should be able to identify practices that ensure their personal safety and the safety of others and to demonstrate an understanding of the importance of these practices. This includes knowing why spills of any kind should be cleaned up immediately, and why it is important to put all tools, equipment, and materials away where they belong at the end of their explorations.

Fundamental Concepts	Big Ideas
Structure and Function Matter	<p>Objects have observable characteristics and are made from materials. <i>(Overall expectation 3)</i></p> <p>Materials have specific properties. <i>(Overall expectations 2 and 3)</i></p> <p>An object is held together by its structure. <i>(Overall expectation 2)</i></p> <p>The materials and structure of an object determine its purpose. <i>(Overall expectations 1 and 3)</i></p> <p>Humans make choices related to their use of objects and materials that have a direct effect on the environment. <i>(Overall expectation 1)</i></p>

OVERALL EXPECTATIONS

By the end of Grade 1, students will:

1. assess the impact on people and the environment of objects and structures and the materials used in them;
2. investigate structures that are built for a specific purpose to see how their design and materials suit the purpose;
3. demonstrate an understanding that objects and structures have observable characteristics and are made from materials with specific properties that determine how they are used.

SPECIFIC EXPECTATIONS

1. Relating Science and Technology to Society and the Environment

By the end of Grade 1, students will:

- 1.1 identify the kinds of waste produced in the classroom, and plan and carry out a classroom course of action for minimizing waste, explaining why each action is important

Sample prompts: Many children in our class bring their lunch to school, and after lunch our garbage can is full of soft-drink cans, tinfoil, plastic wrap, apple cores, and orange rinds. Where else might we put some of these things? Our class likes to do cut-and-paste activities, and we all like the fresh new sheets of paper. How else might we find the paper that we need? When we tidy up, we put all of the scraps in the garbage pail. What else might we do with them?

- 1.2 assess objects in their environment that are constructed for similar purposes (*e.g., chairs at home and at school; different kinds of shoes; different kinds of floor coverings*) in terms of the type of materials they are made from, the source of these materials, and what happens to these objects when they are worn out or no longer needed

Sample guiding questions: What is the purpose of the objects you have chosen? In what ways are your objects the same? In what ways are they different? Where might someone get the materials from which one of your objects is made (*e.g., wood from trees, cotton from plants*)? In what ways is each of your objects well suited for the place it is in or the task that it does? What happens to your object when it can no longer do the job it was designed to do? What might be some alternative ways of “disposing” of your object (*e.g., shoes that no longer fit can be given to a younger sibling or to a community group for distribution to someone who can use them; the wood from an old chair might be used to build a play table and chairs*)?

2. Developing Investigation and Communication Skills

By the end of Grade 1, students will:

- 2.1 follow established safety procedures during science and technology investigations (*e.g., wear safety goggles when using saws and hammers*)

- 2.2 investigate characteristics of various objects and structures, using their senses

- 2.3 investigate, through experimentation, the properties of various materials (*e.g., the best materials for absorbing or repelling water, for flexibility, for strength: the flexibility of plastic makes plastic wrap useful for covering food in order to keep it fresh; the impermeability of rubber enables rubber boots to keep feet dry*)

- 2.4 use technological problem-solving skills (see page 16), and knowledge acquired from previous investigations, to design, build, and test a structure for a specific purpose (*e.g., a tent, a model of a swing set or other playground equipment, a bird feeder, a wigwam for people who need to move throughout the year*)

Sample guiding questions: What is the purpose of your structure? What materials did you use to build your structure? Why did you choose those materials instead of _____ to build your structure? What did you use to fasten your structure together? What might happen to the materials in your structure when it is no longer being used?

- 2.5 use appropriate science and technology vocabulary, including *experiment, explore, purpose, rigid, flexible, solid, and smooth*, 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 their choices of materials and design decisions when presenting their structures*)

3. Understanding Basic Concepts

By the end of Grade 1, students will:

- 3.1 describe objects as things that are made of one or more materials
- 3.2 describe structures as supporting frameworks
- 3.3 describe materials as the substances from which something is made
- 3.4 describe the function/purpose of the observable characteristics (*e.g., texture, height, shape, colour*) of various objects and structures, using information gathered through their senses (*e.g., sandpaper is rough to help take the rough edges off wood; a traffic light is tall so it can be easily seen; a stop sign is the same shape and colour in many countries around the world to make it easily recognizable*)
- 3.5 identify the materials that make up objects and structures (*e.g., wood, plastic, steel, paper, polystyrene foam, cloth*)
- 3.6 distinguish between objects (including structures) and materials found in nature (*e.g., tree: sap*) and those made by humans (*e.g., toy: plastic*)
- 3.7 describe the properties of materials that enable the objects and structures made from them to perform their intended function
- 3.8 list different kinds of fasteners (*e.g., tape, glue, button, zipper*), and describe the uses of each
- 3.9 identify the sources in nature of some common materials that are used in making structures (*e.g., paper and rubber come from trees; plastic comes from petroleum; steel comes from metals and minerals in the ground*)

GRADE 1 | UNDERSTANDING MATTER AND ENERGY

ENERGY IN OUR LIVES

OVERVIEW

Energy is a commonly used term that describes an important part of daily life. Since the concept of energy can be abstract, it is important to approach this topic in a practical, hands-on manner. Students will explore and identify different ways in which energy is used every day, especially by living things as a means of survival. Students will also develop an understanding that they have a variety of choices when using energy, and that these choices should be made responsibly. Because the amount and types of energy we use can change with the seasons, this topic could be combined with another Grade 1 science and technology topic, Understanding Earth and Space Systems: Daily and Seasonal Changes.

Students in Grade 1 will encounter very few hazards in their explorations of energy. However, it is important that they be able to identify general practices that ensure their personal safety and the safety of others and to demonstrate an understanding of the importance of these practices. This includes knowing why work spaces should be kept tidy and uncluttered, and why it is important to follow the teacher's instructions carefully.

Fundamental Concepts	Big Ideas
Energy Sustainability and Stewardship	<p>Everything that happens is a result of using some form of energy. <i>(Overall expectations 1, 2, and 3)</i></p> <p>The sun is the principal source of energy for the earth. <i>(Overall expectation 3)</i></p> <p>Humans need to be responsible for the way in which we use energy. <i>(Overall expectations 1 and 2)</i></p>

OVERALL EXPECTATIONS

By the end of Grade 1, students will:

1. assess uses of energy at home, at school, and in the community, and suggest ways to use less energy;
2. investigate how different types of energy are used in daily life;
3. demonstrate an understanding that energy is something that is needed to make things happen, and that the sun is the principal source of energy for the earth.

SPECIFIC EXPECTATIONS

1. Relating Science and Technology to Society and the Environment

By the end of Grade 1, students will:

- 1.1 describe their own and their family's uses of energy (*e.g., to operate lights, video games, cars, computers*); identify ways in which these uses are efficient or wasteful, taking different points of view into consideration (*e.g., the point of view of a parent, a sibling, a member of their extended family*); suggest ways to reduce personal energy consumption; and explain why it is important for people to make these choices

Sample issues: "My house is a few blocks from my school, but every day my dad drives me to and from school in the car, because he wants me to be safe." "My brothers and sisters all have MP3 players and video games, and they use a lot of batteries to keep them running." "We try to turn out the lights when we aren't in a room, but Grandma needs the lights to move around the house safely."

- 1.2 describe how the everyday lives of different people and other living things would be affected if electrical energy were no longer available (*e.g., families, farmers, businesses and stores, a company that offers alternative energy sources such as solar-powered devices, the plants in a hydroponic greenhouse, the tropical animals in a Canadian zoo*)

2. Developing Investigation and Communication Skills

By the end of Grade 1, students will:

- 2.1 follow established safety procedures during science and technology investigations (*e.g., keep work spaces neat and tidy by putting all tools, materials, and equipment back where they belong*)
- 2.2 investigate how the sun affects the air, land, and/or water, using a variety of methods (*e.g., standing outside on a sunny and a cloudy day and noting the differences; putting a dish of water in the sun and the shade and observing what happens*) and resources (*e.g., books, videos/ DVDs, CD-ROMs, the Internet*)

- 2.3 design and construct a device that uses energy to perform a task (*e.g., a kite that flies using the wind; a musical instrument that uses human energy to make sounds*)

- 2.4 investigate and compare seasonal differences in the ways we use energy and the types of energy we use (*e.g., we keep warm in winter by wearing a sweater and using furnaces and woodstoves; we stay cool in summer by sitting in the shade or going to places that are air conditioned; we adjust the amount of light we need by opening or closing the curtains and turning lights on or off*)

- 2.5 use scientific inquiry/experimentation skills (see page 12), and knowledge acquired from previous investigations, to explore the effects of light and heat from the sun (*e.g., by growing plants in the presence and absence of sunlight; by feeling the temperature of dark papers that have been in the sun and in the shade; by covering a portion of a piece of coloured paper and exposing the paper to the sun*)

- 2.6 investigate how the sun's energy allows humans to meet their basic needs, including the need for food (*e.g., trace the flow of energy from the sun, which provides energy to plants, which make food for animals to eat, and then from plants and animals, which provide food for humans to eat*)

- 2.7 use appropriate science and technology vocabulary, including *explore, investigate, design, energy, and survival*, 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 labelled diagrams to show what happened when plants were grown in varying light conditions*)

3. Understanding Basic Concepts

By the end of Grade 1, students will:

- 3.1 demonstrate an understanding that energy is what makes the things they do or see happen
- 3.2 demonstrate an understanding that the sun, as the earth's principal source of energy, warms the air, land, and water; is a source of light for the earth; and makes it possible to grow food

- 3.3 identify food as a source of energy for themselves and other living things
- 3.4 identify everyday uses of various sources of energy (*e.g., food to help animals, including humans, survive and move; natural gas to heat homes and schools; petroleum to power cars and buses; electricity to power lights; batteries to power toys*)
- 3.5 demonstrate an understanding that humans get the energy resources they need from the world around them (*e.g., the wood, oil, and gas to heat our homes and cook our food*) and that the supply of many of these resources is limited so care needs to be taken in how we use them

GRADE 1 | UNDERSTANDING EARTH AND SPACE SYSTEMS

DAILY AND SEASONAL CHANGES

OVERVIEW

In observing their environment, students become aware of changes that take place in it, including changes in temperature, wind, and light and in plants and animals. The study of Daily and Seasonal Changes focuses on easily observed changes that occur in cycles, including day and night and the four seasons, and on how these changes affect living things. Since many of these cycles depend upon the light and/or heat of the sun, combining this topic with the Grade 1 topic Energy in Our Lives would enable the students to have a fuller understanding of the relationship among events in their environment and between the environment and themselves.

This topic presents very few safety challenges for young children. However, it is important that they be able to identify general practices that ensure their personal safety and the safety of others and to demonstrate an understanding of the importance of these practices. This includes knowing why it is important to be protected from the sun when conducting investigations outdoors and why they should always stay within the space being studied.

Connections can be made with another Grade 1 science and technology topic, Understanding Life Systems: Needs and Characteristics of Living Things, as students investigate how living things adapt to seasonal changes and recognize the importance of living things in our environment. Connections can also be made with Understanding Matter and Energy: Energy in Our Lives with regard to the use of energy in various seasons.

Fundamental Concepts	Big Ideas
Change and Continuity	Changes occur in daily and seasonal cycles. (<i>Overall expectations 1, 2, and 3</i>) Changes in daily and seasonal cycles affect living things. (<i>Overall expectations 1 and 3</i>)

OVERALL EXPECTATIONS

By the end of Grade 1, students will:

1. assess the impact of daily and seasonal changes on living things, including humans;
2. investigate daily and seasonal changes;
3. demonstrate an understanding of what daily and seasonal changes are and of how these changes affect living things.

SPECIFIC EXPECTATIONS

1. Relating Science and Technology to Society and the Environment

By the end of Grade 1, students will:

- 1.1 assess the impact of daily and seasonal changes on human outdoor activities (*e.g., farming, gardening, swimming, skating, soccer*) and identify innovations that allow for some of these activities to take place indoors out of season (*e.g., greenhouses allow farming and gardening to happen in cold weather; arenas can make ice in all seasons for skating and hockey; community centres can provide warm places in all seasons for swimming*)

Sample guiding questions: Why do you and your family do different things outdoors during the day than at night? What are some outdoor human activities that can go on in any season? Why can this happen? What are some outdoor activities that can happen only in certain seasons? Why? How might it be possible for these activities to happen in other seasons? What might be some advantages and disadvantages of making this happen?

- 1.2 assess ways in which daily and seasonal changes have an impact on society and the environment (*e.g., In winter, some people suffer from seasonal disorders because there is less light from the sun than in summer. When the weather gets cold, people turn on heat in their homes; when the weather gets hotter they turn on fans, air conditioners, and pool heaters and pumps, all of which means that more energy is being used. At night in winter, when people get home from work and school, they all turn on appliances at around the same time [peak hours], which puts a strain on the power supplies. In summer, people increase their use of water to wash their cars and water their lawns and gardens; unless there is plenty of rain, this usage of water puts a strain on water supplies. In winter, it is harder for birds that do not migrate and animals that do not hibernate to find food and water. Some plants die when summer is over; others undergo changes, such as losing their leaves and going dormant until spring. The Anishinaabe people tell their stories only in the winter when there is snow on the ground.*)

2. Developing Investigation and Communication Skills

By the end of Grade 1, students will:

- 2.1 follow established safety procedures during science and technology investigations (*e.g., never look directly at the sun; wear a hat and sunscreen when working outdoors*)
- 2.2 investigate the changes in the amount of light from the sun that occur throughout the day and year (*e.g., compare the amount of light observed at bedtime during summer vacation with the amount observed at bedtime during winter vacation*)
- 2.3 investigate the changes in the amount of heat from the sun that occur throughout the day and in the various seasons (*e.g., use their prior experience of the sun's warmth, and measure, record, and compare outdoor temperatures at different times of day and in different months of the year*)
- 2.4 use scientific inquiry/research skills (see page 15), including generating questions and knowledge acquired from previous investigations, to identify daily and/or seasonal changes and their effects (*e.g., the sun shines during the day, and the moon and stars are visible at night; leaves change colour in the fall; there are fewer birds in winter; dogs' fur gets thicker in winter; trees and flowers bloom in spring*)

Sample guiding questions: What are some changes that take place between day and night? What changes in plants, animals, and the weather take place between summer and fall? Between fall and winter? Between winter and spring? How do these changes affect your activities and those of your family?

- 2.5 use appropriate science and technology vocabulary, including *investigate, temperature, hibernate, dormant, energy, and survival*, 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., contribute to a class book about their observations of seasonal changes; keep a weekly pictorial journal in which they record and describe the weather through the seasons*)

3. Understanding Basic Concepts

By the end of Grade 1, students will:

- 3.1 identify the sun as Earth's principal source of heat and light
- 3.2 define a cycle as a circular sequence of events
- 3.3 describe changes in the amount of heat and light from the sun that occur throughout the day and the seasons
- 3.4 describe and compare the four seasons (*e.g., in terms of amount of daylight, type of precipitation, temperature*)
- 3.5 describe changes in the appearance or behaviour of living things that are adaptations to seasonal changes (*e.g., in fall, some plants shed their leaves and some birds migrate; in winter some animals change colour*)
- 3.6 describe how humans prepare for and/or respond to daily and seasonal changes (*e.g., by wearing appropriate clothing, carrying an umbrella, turning on an air conditioner or heater*)