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Section A: Ontario Life Science Curriculum Cross-reference of

Below Zero Activities with Grade Levels K-8

Activity	Grades								
	K	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Adaptarmigan II - 9		X	X	X	X				
A Furry Plant? III - 2				X	X	X	X	X	X
An Ice Place to Be IV - 5						X	X	X	X
Bird Banquet **I - 6**	X	X	X	X	X	X	X		
Cold Busters I-7				X	X	X	X	X	X
Cosy in the Cold III - 12					X	X	X	X	X
Design a Shelter II - 2			X	X	X	X			
Dinner Time IV - 7				X	X	X			
Dress Like a Polar Bear III - 8	X	X	X	X	X	X	X		
Fishy Deep Freeze II - 7							X	X	
Flaky Formation I - 3			X	X	X	X	X	X	
Follow the Leader I - 9				X	X	X	X		
Frost Free Feather Friends III - 7	X	X	X	X					
Hare Ways I - 1			X	X	X	X	X		
Icicle Magic I - 5		X	X	X	X	X			
It's a Gasp II - 8								X	X
Kindness That Kills IV - 4	X	X	X	X	X	X	X	X	X
Look at the Snow I - 4					X	X	X	X	X
Make Your Own Icebergs I - 8	X	X	X	X	X	X			
Mighty Migrators IV - 6					X	X	X		
Moose Morsels II - 11		X	X	X					
Neat Feet III - 13	X	X	X	X					
Ready , Set, Snow III - 1		X	X	X	X	X	X		
Shocking Snow IV - 2							X	X	X
Snakes and Ladders III - 15					X	X	X	X	
Snow Experiments II - 4					X	X	X	X	X
Snow Floats III - 4					X	X	X	X	X
Snow Lovers and Haters III - 3					X	X	X	X	X
Snow Mobile Savvy IV - 1								X	X
Snow Place Like Home II - 3					X	X	X	X	X
Snow Sense II - 5					X	X	X	X	X
Snow Tours I - 2				X	X	X	X		
Snow Way to Hide II - 12	X	X	X	X					
Snug Under the Snow II - 6					X	X	X	X	X

Activity	Grades								
	K	1	2	3	4	5	6	7	8
The Acid Test IV - 3			X	X	X	X	X	X	X
The Benefit of Big III - 11			X	X	X	X	X	X	X
The Great Escape II - 9				X	X	X	X	X	X
Twiggy Tales I - 10			X	X	X	X	X	X	
What Gall III - 14			X	X	X	X	X	X	
Whine and Dine II - 10				X	X	X	X		
Winter Buddies III - 6	X	X	X	X	X	X	X		
Winter Signals I - 1	X	X	X	X					
Winter Survival II - 1				X	X	X	X	X	
Winter Wise Insects III - 5				X	X	X	X		
Winter Wonders III - 10								X	X
Wise Wintering Plants	X	X	X	X	X				

Section B: Project WILD Cross-Reference with the Ontario Curriculum Strands and Topics: Science and Technology, Grades 1-8

The Kindergarten Program: - SCIENCE AND TECHNOLOGY

By the end of Kindergarten, children will:

- Demonstrate curiosity and willingness to explore and experiment;
- Demonstrate understanding of and care for the natural world;

- Demonstrate an awareness of the characteristics and functions of some common materials;
- Demonstrate understanding of strategies for planning and organizing;
- Recognize and use some common forms of technology.

EXPLORATION AND EXPERIMENTATION

- describe some natural occurrences, using their own observations (e.g., sprouting of seeds; opening of buds; falling off leaves in autumn);

- describe some differences between living and non-living things (e.g., animals grow and need food, water, sun, whereas rocks do not);

- describe local natural habitats (e.g., ponds, nests, trees);

- identify patterns and cycles in the natural world (e.g., pattern of petals on a flower; life cycle of a butterfly);

- describe characteristics of natural materials and demonstrate understanding of some basic concepts related to then (e.g., wet and dry sand, water, leaves);

- describe the functions of common objects found at home and at school (e.g., tools, cooking utensils, toys);

- identify energy sources used by familiar tools or toys (e.g., electricity, wind, batteries);

- experiments with simple machines (e.g., pump, ramp, marble run);

- make a specific plan (e.g., *I'm going to build a tower to hold up my ramp*), describe the steps, and carry out the plan;

- make appropriate observations about results or findings (e.g., comment on the difficulty of a task or the effectiveness of a strategy);

- demonstrate awareness of the need for recycling.

USE OF TECHNOLOGY

- use familiar technology appropriately (e.g., overhead projectors, cassette recorders, and computers);

- identify familiar technological items and describe their use in daily life

(e.g., telephone, videocassette recorder)

-make things using a variety of tools and techniques (e.g., hammer, screwdriver, glue, stapler);

Bird Banquet I - 6

Snow Way To Hide II - 12

Winter Signals I - 1

Neat Feet III - 13

Neat Feet III - 13

- work with others in using technology (e.g., share tools; build as a group; work in pairs at the computer);

- demonstrate awareness that familiar objects are designed to suit the human body (e.g., mittens and gloves, tricycles).

Dress Like A Polar Bear III - 8

Frost-Free Feathered Friends III - 7
Make Your Own Icebergs I - 8
Wise Winter Plants III - 10

1.0 Life Systems: Grade 1 – Characteristics and Needs of Living Things

1.1 Overview

The study of Life Systems in Grade 1 focuses on an investigation of the characteristics and basic needs of living things.

Students will explore aspects of movement and behavior in humans and other animals, and will learn about their nutritional requirements. Students will also explore some basic aspects of growth in animals and plants. In all their investigations, students will continually refine their ability to observe, using all five senses, and will attempt to describe their observations as accurately as possible.

1.2 Overall Expectations

By the end of Grade 1, students will:

-demonstrate an understanding of the basic needs of animals and plants (e.g., the need for food, air, and water);

-investigate the characteristics and needs of animals and plants;

-demonstrate awareness that animals and plants depend on their environment to meet their basic needs, and describe the requirements for good health for humans.

1.3 Specific Expectations

1.3.1 Understanding Basic Concepts

By the end of Grade 1, students will:

-identify major parts of the human body and describe their functions (e.g., arms and legs for movement; lungs and nose for breathing);	Frost Free-Feather Friends III - 7 Dress Like a Polar Bear III - 8
-identify the location and function of each sense organ; classify characteristics of animals and plants by using the senses (e.g., texture, colour, size, sounds);	Snow Way to Hide II - 12
-describe the different ways in which animals move (e.g., moles burrow with their large, strong front limbs; fish undulate their bodies) to meet their needs;	Winter Signals I -1 Snow Way to Hide II - 12 Winter Buddies III - 6 Frost Free-Feather Friends III - 7 Neat Feet III - 13
-identify and describe common characteristics of humans and other animals that they have observed, and identify variations in these characteristics (e.g., eye and hair colour);	Dress Like a Polar Bear III - 8 Adaptarmigan III - 9 Neat Feet III - 13
-describe some basic changes in humans as they grow (e.g., growth of feet, hands, arms; loss of baby teeth), and compare changes in humans with changes in other living things;	Ready, Set, Snow III - 1
-describe patterns that they have observed in living things (e.g., sunflower, pine cone, turtle's shell).	Bird Banquet I - 6

1.3.2 Developing Skills of Inquiry, Design, and Communication

By the end of Grade 1, students will:

- select and use appropriate tools to increase their capacity to observe (e.g., magnifying glass, stethoscope);	Wise Wintering Plants III - 10
- ask questions about and identify some needs of living things, and explore possible answers to these questions and ways of meeting these needs (e.g., predict how an animal will move on the basis of two or more characteristics that they have observed);	Winter Signals I -1 Bird Banquet I - 6 Wise Wintering Plants III - 10
- plan investigations to answer some of these questions or find ways of meeting these needs; use appropriate vocabulary in describing their investigations, explorations, and observations (e.g., use body, legs, wings, and feelers in describing an insect);	Bird Banquet I - 6 Wise Wintering Plants III - 10
- record relevant observations, findings, and measurements, using written language, drawings, charts, and concrete materials (e.g., make a drawing of an insect, observing with the unaided eye, and a drawing of the same insect while using a magnifying glass);	Winter Signals I -1 Bird Banquet I - 6 Wise Wintering Plants III - 10
-communicate the procedures and results of investigations for specific purposes, using demonstrations, drawings, and oral and written descriptions (e.g., demonstrate how a bird builds a nest).	Bird Banquet I - 6 Wise Wintering Plants III - 10

1.3.3 Relating Science and Technology to the World Outside the School

By the end of Grade 1, students will:

-compare the basic needs of humans with the needs of other living things (e.g., the need for food, air, water, light);	Winter Signals I -1 Ready, Set, Snow III - 1 Kindness That Kills IV - 4
-compare ways in which humans and other animals use their senses to meet their needs (e.g., use of the senses of sight and smell in finding food);	Snow Way to Hide II - 12
-describe ways in which people adapt to the loss or limitation of sensory or physical ability (e.g., blind people develop more acute hearing; people who cannot walk may use a wheel chair);	
-identify a familiar animal or plant from seeing only a part of it (e.g., a feather of a bird, a leaf of a tree);	Bird Banquet I - 6

-describe ways in which the senses can both protect and mislead (e.g., seeing enables us to avoid walking into an obstacle; the sense of smell is not reliable when we have a cold);

-describe a balanced diet using the four basic food groups outlined in Canada's Food Guide to Healthy Eating, and demonstrate awareness of the natural sources of items in the food groups (e.g., bread is made from plant products; meat and milk come from animals);

-identify ways in which individuals can maintain a healthy environment for themselves and for other living things (e.g., practice cleanliness to reduce the spreading of germs; ensure that materials such as toy balloons are not left outdoors since they are harmful to birds if they are ingested).

Bird Banquet I - 6
Dress Like a Polar Bear III - 8
Kindness That Kills IV - 4

2.0 Life Systems: Grade 2 – Growth and Changes in Animals

2.1 Overview

The study of animals in Grade 2 focuses on patterns of growth and change. Since children are interested in the changes that take place in different types of animals, observing these changes can be a powerful learning experience for them. In their exploration of growth, students will also compare patterns of growth in different animals with their own growth, and they will learn about the conditions needed to support healthy development in an animal.

2.2 Overall Expectations

By the end of Grade 2, students will:

-demonstrate an understanding of the similarities and differences among various types of animals and the ways in which animals adapt to different environmental conditions;

-investigate physical and behavioural characteristics and the process of growth of different types of animals;

-identify ways in which humans can affect other animals.

2.3 Specific Expectations

2.3.1 Understanding Basic Concepts

By the end of Grade 2, students will:

- identify and describe the major physical characteristics of different types of animals (e.g., mammals, reptiles, insects);	Moose Morsels II - 11 Frost Free-Feather Friends III - 7 Adaptarmigan III - 9
-identify and describe behavioural characteristics that enable animals to survive (e.g., migration, dormancy, hibernation);	Winter Signals I -1 Hare Ways I - 11 Design a Shelter II - 2 Ready, Set, Snow III - 1 Winter Buddies III - 6 The Benefit of Big III - 11
-classify a variety of animals using observable characteristics (e.g., size, body covering, teeth);	Bird Banquet I - 6 Moose Morsels II - 11 Neat Feet III - 13
-compare ways in which animals eat their food (e.g., tear flesh, crack shells), move, and use their environment to meet their needs (e.g., gather grass and twigs to build nests);	Bird Banquet I - 6 Snow Way to Hide II - 12 The Benefit of Big III - 11 Kindness That Kills IV - 4
-describe changes in the appearance and activity of an animal as it goes through a complete life cycle (e.g., mealworm);	Winter Signals I -1 What Gall! III - 14
-compare the life cycles of some animals that have similar life cycles (e.g., bee and butterfly) and some that have different life cycles (e.g., gerbil and butterfly);	
-identify constant traits (e.g., number of legs) and changing traits (e.g., weight) in animals as they grow, and compare the appearance of young and mature animals of the same species;	

-describe ways in which animals respond and adapt to their environment (e.g., weasels change colour for camouflage in summer and winter; mammals living in colder climates have longer fur);

Winter Signals I -1
Hare Ways I - 11
Design a Shelter II - 2
Ready, Set, Snow III - 1
Dress Like a Polar Bear III - 8
Adaptarmigan III - 9
The Benefit of Big III - 11
What Gall! III - 14

-compare ways in which different animals care for their young (e.g., bears, alligators, sea turtles).

2.3.2 Developing Skills of Inquiry, Design, and Communication

By the end of Grade 2, students will:

-ask questions about and identify some needs of different animals with which they are familiar, and explore possible answers to these questions and ways of meeting these needs (e.g., examine different kinds of teeth and explain how their shape enables an animal to bite, tear, or grind its food);

Bird Banquet I - 6

-plan investigations to answer some of these questions or find ways of meeting these needs, and describe the steps involved;

Bird Banquet I - 6

-use appropriate vocabulary in describing their investigations, explorations, and observations (e.g., use the words egg, caterpillar, larva, chrysalis, and adult in describing the metamorphosis of a butterfly);

Bird Banquet I - 6

- record relevant observations, findings, and measurements, using written language, drawings, and concrete materials (e.g., make accurately labeled drawings showing the life cycle of an animal);

Bird Banquet I - 6

-communicate the procedures and results of investigations for specific purposes, using drawings, demonstrations, and oral and written descriptions (e.g., explain

how a caterpillar feeds, using a model constructed of modeling clay and a tree branch).

Bird Banquet I - 6

2.3.3 Relating Science and Technology to the World Outside the School

By the end of Grade 2, students will:

-describe features of the environment that support the growth of familiar animals (e.g., water and insects in a frog's environment);

Design a Shelter II - 2

-identify and compare the effects of the seasons on animals (e.g., some animals grow a thicker coat in cold weather);	Winter Signals I -1 Kindness That Kills IV - 4
-describe ways in which humans can help or harm other living things (e.g., protecting endangered species);	Bird Banquet I - 6 Kindness That Kills IV - 4
-demonstrate an understanding of the requirements of small animals for survival (e.g., by maintaining an aquarium or a terrarium);	
-describe the life processes of an animal that they have observed (e.g., the eating habits, movement, rest patterns, and breathing of a mealworm);	Hare Ways I - 11
-demonstrate awareness of ways of caring for animals properly (e.g., avoid handling them too much; research nutritional requirements);	Bird Banquet I - 6
-describe how humans produce food by raising livestock (e.g., pigs, chickens, cattle).	

3.0 Life Systems: Grade 3 – Growth and Changes in Plants

3.1 Overview

The study of plants in Grade 3 focuses on the characteristics and requirements of plants and their patterns of growth. Students will observe and investigate a wide variety of local plants, from trees to mosses, in their natural environment. They will also learn about the importance of plants not only as sources of food and shelter for people and animals, but as suppliers of much of the world's oxygen.

3.2 Overall Expectations

By the end of Grade 3, students will:

-demonstrate an understanding of the similarities and differences in the physical characteristics of different plant species and the changes that take place in different plants as they grow;

-investigate the requirements of plants and the effects of changes in environmental conditions on plants;

-describe ways in which plants are important to other living things, and the effects of human activities on plants.

3.3 Specific Expectations

3.3.1 Understanding Basic Concepts

By the end of Grade 3, students will:

-identify the major parts of plants (e.g., seeds, stem, pistil) and describe their basic functions; classify plants according to visible characteristics (e.g., type of tree bark, leaf shape, type of flowers);	Twiggy Tales I - 10 A Furry Plant? III - 2 Wise Wintering Plants III - 10
-describe, using their observations, the changes that plants undergo in a complete life cycle (e.g., from the germination of a seed to the production of flowers or fruit);	The Acid Test IV - 3
-describe, using their observations, the effects of the seasons on plants (e.g., leaf buds grow into leaves in the spring; leaves turn colour in the fall); -compare the life cycles of different kinds of plants (e.g., plants that grow from bulbs or from seeds);	Twiggy Tales I - 10 A Furry Plant? III - 2 Wise Wintering Plants III - 10
-identify traits that remain constant in some plants as they grow (e.g., leaf shape, leaf size, flower colour);	
-describe, using their observations, how	A Furry Plant? III - 2

the growth of plants is affected by changes in environmental conditions (e.g., changes in light, soil);	Wise Wintering Plants III - 10 What Gall! III - 14 The Acid Test IV - 3
-explain how different features of plants help them survive (e.g., leaf structure, fibrous or tap root systems).	A Furry Plant? III - 2 Wise Wintering Plants III - 10

3.3.2 Developing Skills of Inquiry, Design, and Communication

By the end of Grade 3, students will:

-design and conduct a hands-on inquiry into seed germination or plant growth;	The Acid Test IV - 3
-ask questions about and identify some needs of plants, and explore possible answers to these questions and ways of meeting these needs (e.g., predict how long a particular plant could go without water before its leaves started to droop);	Wise Wintering Plants III - 10 The Acid Test IV - 3
-plan investigations to answer some of these questions or find ways of meeting these needs, and explain the steps involved;	Wise Wintering Plants III - 10 The Acid Test IV - 3
-use appropriate vocabulary in describing their investigations, explorations, and observations (e.g., stem, pistil, stamen, flower);	Wise Wintering Plants III - 10 The Acid Test IV - 3
-record relevant observations, findings, and measurements, using written language, drawings, charts, and graphs (e.g., produce a series of drawings to show a plant at different stages of development);	Wise Wintering Plants III - 10 The Acid Test IV - 3
-communicate the procedures and results of investigations for specific purposes and to specific audiences, using drawings, demonstrations, simple media works, and oral and written descriptions (e.g., make a graph that shows the number and kinds of trees found in different yards; design and construct a terrarium or garden that reproduces the conditions that they found to be requirements of specific plants).	Wise Wintering Plants III - 10 The Acid Test IV - 3

3.3.3 Relating Science and Technology to the World Outside the School

By the end of Grade 3, students will:

- describe ways in which humans use plants for food, shelter, and clothing (e.g., trees are used for building houses; cloth is made from cotton	Cold Busters I-7 What Gall! III - 14
- describe ways in which humans can protect natural areas to maintain native plant species (e.g., establishing conservation areas, wildlife reserves, wetland sanctuaries);	
-identify the parts of a plant that are used to produce specific products for humans (e.g., sugar, dyes, paper, cloth, lumber) and describe the steps in production;	
-describe various plants used in food preparation (e.g., vegetables, fruits, spices, herbs) and identify places where they can be grown;	
-describe various settings in which plant crops are grown (e.g., farms, orchards, home gardens);	
-describe ways in which plants and animals depend on each other (e.g., plants provide food for energy, and animals help distribute pollen and seeds);	Bird Banquet I - 6 Winter Survival II - 1 What Gall! III - 14 Kindness That Kills IV - 4
-compare the requirements of some plants and animals, and identify the requirements that are common to all living things (e.g., the need for water and minerals);	
-demonstrate awareness of ways of caring for plants properly (e.g., ensure that a plant has sufficient light and water);	
- identify some functions of different plants in their local area (e.g., trees provide shade; grass binds soil to prevent soil erosion).	

4.0 Life Systems: Grade 4 – Habitats and Communities

4.1 Overview

Students in Grade 4 will be familiar with the basic needs of plants and animals, and will begin to explore and compare ways in which communities of plants and animals satisfy their needs in specific habitats. In their investigations, they will also study some of the factors that affect various habitats, including changes that occur naturally and changes brought about by people.

4.2 Overall Expectations

By the end of Grade 4, students will:

-demonstrate an understanding of the concepts of habitat and community, and identify the factors that could affect habitats and communities of plants and animals;

-investigate the dependency of plants and animals on their habitat and the interrelationships of the plants and animals living in a specific habitat;

-describe ways in which humans can change habitats and the effects of these changes on the plants and animals within the habitats.

4.3 Specific Expectations

4.3.1 Understanding Basic Concepts

By the end of Grade 4, students will:

-identify, through observation, various factors that affect plants and animals in a specific habitat (e.g., availability of water, food sources, light; ground features; weather conditions);	Snow Tours I - 1 Follow the Leader I - 9 Twiggy Tales I - 10 Hare Ways I - 11 Winter Survival II - 1 Design a Shelter II - 2 Whine and Dine II - 10 Ready, Set, Snow III - 1 A Furry Plant? III - 2 Snow Lovers and Haters III - 3 Dress Like a Polar Bear III - 8 Snakes and Ladders III - 15
-classify organisms according to their role in a food chain (e.g., producer, consumer);	The Great Escape II - 9
-demonstrate an understanding of a food chain as a system in which energy from the sun is transferred eventually to animals, construct food chains of different plant and animal species (e.g. carrot -rabbit - fox), and classify animals as omnivore, carnivore, and herbivore;	Whine and Dine II - 10 Winter Buddies III - 6 Snakes and Ladders III - 15 Dinner Time IV - 7
-describe structural adaptations of	Snow Tours I - 1

plants and animals that demonstrate a response of the living things to their environment (e.g., the height of a plant depends on the amount of sunlight the plant gets; many animals that live in the Arctic have white fur);	Cold Busters I-7 Snow Experiments II - 4 Snug Under the Snow II - 6 Winter-wise Bugs II - 13 A Furry Plant? III - 2 Snow Lovers and Haters III - 3 Adaptarmigan III - 9 Wise Wintering Plants III - 10 The Benefit of Big III - 11 What Gall! III - 14 Dinner Time IV - 7
-recognize that animals and plants live in specific habitats because they are dependent on those habitats and have adapted to them (e.g., ducks live in marshes because they need marsh plants for food and shelter and water for movement);	Snow Place Like Home II - 3 Snow Experiments II - 4 Snug Under the Snow II - 6 Wise Wintering Plants III - 10 Mighty Migrators IV - 6
-classify plants and animals that they have observed in local habitats according to similarities and differences (e.g., in shape, location).	Snow Tours I - 1 A Furry Plant? III - 2

4.3.2 Developing Skills of Inquiry, Design, and Communication

By the end of Grade 4, students will:

-formulate questions about and identify the needs of animals and plants in a particular habitat, and explore possible answers to these questions and ways of meeting these needs (e.g., predict the structural adaptations, such as webbed feet, that help aquatic animals live in water);	Bird Banquet I - 6 Wise Wintering Plants III - 10 Cozy in the Cold III - 13
- plan investigations for some of these answers and solutions, identifying variables that need to be held constant to ensure a fair test and identifying criteria for assessing solutions;	Bird Banquet I - 6 Wise Wintering Plants III - 10 Cozy in the Cold III - 13
-use appropriate vocabulary, including correct science and technology terminology, in describing their investigations, explorations, and observations (e.g., habitat, population, ecological niche, community, food chain);	Bird Banquet I - 6 Wise Wintering Plants III - 10 Cozy in the Cold III - 13
-compile data gathered through investigation in order to record and present results, using tally charts, tables, and labeled graphs produced by hand or with a computer (e.g., display data gathered in a population-simulation exercise, using a labeled graph; classify species of insects in the neighborhood	Bird Banquet I - 6 Wise Wintering Plants III - 10 Cozy in the Cold III - 13

according to habitat, using a chart or table);

- communicate the procedures and results of investigations for specific purposes and to specific audiences, using media works, oral presentations, written notes and descriptions, drawings, and charts (e.g., prepare a poster illustrating the components of a local habitat; trace a food chain in an illustrated chart, using the sun as the starting point).

Bird Banquet I - 6
Wise Wintering Plants III - 10
Cozy in the Cold III - 13

4.3.3 Relating Science and Technology to the World Outside the School

By the end of Grade 4, students will:

-describe ways in which humans are dependent on plants and animals (e.g., for food products, medicine, clothing, lumber);

Cold Busters I-7

-describe ways in which humans can affect the natural world (e.g., urban development forces some species to go elsewhere and enables other species to multiply too rapidly; conservation areas can be established to protect specific habitats);

Snakes and Ladders III - 15
The Acid Test IV - 3
Kindness That Kills IV - 4

-construct food chains that include different plant and animal species and humans (e.g., grass -cattle -humans); show the effects on plants and animals of the loss of their natural habitat (e.g., nesting sites of ducks may be destroyed when a dam is built);

Dinner Time IV - 7

-investigate ways in which the extinction of a plant or animal species affects the rest of the natural community and humans (e.g., chart the distribution of wolves on a world map and predict the effects if wolves were to become extinct; use a software program that simulates a specific environment to track the effects of the loss of a plant species).

5.0 Life Systems: Grade 5 – Human Organ Systems

5.1 Overview

In Grade 5, study of the human body focuses on five major organ systems – the respiratory, circulatory, digestive, excretory, and nervous systems. Using models and simulations, students will learn where the major internal organs are located and will explore the functions and interactions of organs within specific systems. In studying the structure of organs, students will learn that all living tissues are composed of different kinds of cells. Students will also develop an understanding of the importance of proper nutrition and exercise to the healthy functioning of organ systems.

5.2 Overall Expectations

By the end of Grade 5, students will:

-demonstrate an understanding of the structure and function of the respiratory, circulatory, digestive, excretory, and nervous systems, and the interactions of organs within each system;

-investigate the structure and function of the major organs of the respiratory, circulatory, digestive, excretory, and nervous systems;

-demonstrate understanding of factors that contribute to good health.

5.3 Specific Expectations

5.3.1 Understanding Basic Concepts

By the end of Grade 5, students will:

-identify the cell as the basic unit of life;

-describe the basic structure and function of the major organs in the respiratory, circulatory, digestive, excretory, and nervous systems;

-describe, using models and simulations, ways in which the skeletal, muscular, and nervous systems work together to produce movement (e.g., make a model of the structure of the bones and muscles in an arm, using cardboard rolls and elastic bands);

-identify the skin as an organ and explain its purpose;

-explain what happens to excess nutrients not immediately used by the body;

-describe the components of the body's system of defense against infections (e.g., tears, skin, white blood cells).

5.3.2 Developing Skills of Inquiry, Design, and Communication

By the end of Grade 5, students will:

-formulate questions about and identify the needs of humans, and explore possible answers to these questions and ways of meeting these needs (e.g., in studying the nervous system, investigate response times by having someone catch a ruler between the thumb and index finger after it is dropped by another person;	Cold Busters I-7
-investigate ways in which orthopedic devices, such as back rests, have improved the quality of life);	Cold Busters I - 7
-plan investigations for some of these answers and solutions, identifying variables that need to be held constant to ensure a fair test and identifying criteria for assessing solutions;	Cold Busters I-7
-use appropriate vocabulary, including correct science and technology terminology, in describing their investigations, explorations, and observations (e.g., use terms such as teeth, esophagus, stomach, and gastric juices in describing the digestive system);	Cold Busters I-7
-compile data gathered through investigation in order to record and present results, using tally charts, tables, and labeled graphs produced by hand or with a computer (e.g., record both qualitative and quantitative data from observations of the nutritional value of foods; produce a graph of the heartbeat rate of someone climbing a specific number of stairs in a given length of time); -communicate the procedures and results of investigations for specific purposes and to specific audiences, using media works, oral presentations, written notes and descriptions, drawings, and charts (e.g., create a comparison chart, grouping foods by major nutrients and by their categories in Canada's Food Guide to Healthy Eating).	Cold Busters I-7

5.3.3 Relating Science and Technology to the World Outside the School

By the end of Grade 5, students will:

-describe the types of nutrients in foods (e.g., carbohydrates, fats, proteins, vitamins, minerals) and their function in maintaining a healthy body (e.g., supporting growth);

-identify a balanced diet as one containing carbohydrates, proteins, fats, minerals, vitamins, fibre, and water, and design a diet that contains all of these;

-identify food sources from which people in various societies obtain nutrients (e.g., rice, potatoes, and grains furnish carbohydrates);

-interpret nutritional information to make healthy food choices (e.g., sort commercial cereals into different categories, such as high fat, low fat, high salt, low sugar, and decide which are best);

-demonstrate awareness that some disorders can be affected by diet (e.g., diabetes, heart disease);

-identify types of industries involved in the processing and preserving of foods;

-describe the relationship between eating habits, weight, height, and metabolism;

-describe ways in which various kinds of organisms (e.g., bacteria, fungi) are used to recycle human waste;

-explain the importance of daily physical activity;

-explain how the health of human beings is affected by environmental factors (e.g., smoking, smog, and pollen affect the respiratory system);

Dress Like a Polar Bear III - 8

-explain the benefits and disadvantages of using some technological innovations (e.g., headsets designed to protect ears from excessive noise are helpful, but headphones used to listen to music can cause hearing impairment);

Cold Busters I-7

-describe some types of medical technology (e.g., exercise machines, hearing aids, prosthetics).

6.0 Life Systems: Grade 6 – Diversity of Living Things

6.1 Overview

The study of living things in Grade 6 focuses on the use of classification systems as ways of learning about the great diversity of species and as ways of organizing the study of species. Particular attention is given to the classification of organisms in the animal kingdom. Classifying animals not only will enable students to learn about many different types of animals, from mammals to microscopic organisms, but will help them to observe and describe similarities and differences among species more precisely. To acquire first-hand experience in studying the diversity of living things, students will examine and classify organisms in a specific habitat – a pond, for example.

6.2 Overall Expectations

By the end of Grade 6, students will:

-demonstrate an understanding of ways in which classification systems are used to understand the diversity of living things and the interrelationships among living things;

-investigate classification systems and some of the processes of life common to all animals (e.g., growth, reproduction, movement, response, and adaptation);

-describe ways in which classification systems can be used in everyday life.

6.3 Specific Expectations

6.3.1 Understanding Basic Concepts

By the end of Grade 6, students will:

-explain why formal classification systems are usually based on structural characteristics (e.g., type of skeleton, circulatory system, reproductive system) rather than on physical appearance or behavioural characteristics;	Flaky Formations I - 3 Twiggy Tales I - 10
-recognize that the essential difference between cold- and warm-blooded animals lies in different means of regulating body temperature;	Cold Busters I-7 Snow Experiments II - 4 Fishy Deep Freeze II - 7 Cozy in the Cold III - 13 Snakes and Ladders III - 15
-identify and describe the characteristics of vertebrates, and use these characteristics to classify vertebrates as mammals, birds, amphibians, reptiles, and fish (the five main classes);	Snakes and Ladders III - 15 An Ice Place to Be IV - 5
-identify and describe the characteristics of invertebrates, and classify invertebrates into phyla (e.g., sponges, worms, molluscs, arthropods);	Winter-wise Bugs II - 13
-compare the characteristics of vertebrates and invertebrates;	
-compare the characteristics of different	Winter-wise Bugs II - 13

kinds of arthropods (e.g., crustaceans such as crayfish, shrimp; insects such as grasshoppers, butterflies, mealworms);

-describe microscopic living things using appropriate tools to assist them with their observations (e.g., nets and microscopes for pond study);

-describe ways in which micro-organisms meet their basic needs (e.g., for food, water, air, movement).

6.3.2 Developing Skills of Inquiry, Design, and Communication

By the end of Grade 6, students will:

-formulate questions about and identify the needs of different types of animals, and explore possible answers to these questions and ways of meeting these needs (e.g., design an experiment to study whether certain insects will grow larger if given large quantities of food);

Snow Tours I - 1
Bird Banquet I - 6
Snow Experiments II - 4

-plan investigations for some of these answers and solutions, identifying variables that need to be held constant to ensure a fair test and identifying criteria for assessing solutions;

Bird Banquet I - 6
Snow Experiments II - 4

-use appropriate vocabulary, including correct science and technology terminology, in describing their investigations and observations (e.g., use terms such as organism, species, structure, and kingdom in describing classification of animals);

Bird Banquet I - 6
Snow Experiments II - 4

-compile data gathered through investigation in order to record and present results, using charts, tables, labeled graphs, and scatter plots produced by hand or with a computer (e.g., make an inventory of animals found in a specific location);

Bird Banquet I - 6
Snow Experiments II - 4

-communicate the procedures and results of investigations for specific purposes and to specific audiences, using media works, oral presentations, written notes and descriptions, charts, graphs, and drawings (e.g., create a clearly labeled chart of organisms observed and identified during a pond study).

Bird Banquet I - 6
Snow Experiments II - 4

6.3.3 Relating Science and Technology to the World Outside the School

By the end of Grade 6, students will:

-identify various kinds of classification systems that are based on specific criteria and used to organize information (e.g., in a telephone system, numbers are classified according to country code, area code, telephone number, extension number);	Flaky Formations I - 3
-identify inherited characteristics (e.g., eye colour, hair colour) and learned or behavioural characteristics (e.g., habits of cleanliness);	
-explain why characteristics related to physical appearance (e.g., size, shape, colour, texture) or behavior are not suitable attributes for classifying living things;	
-identify various kinds of plant or animal organisms in a given plot using commercially produced biological or classification keys (e.g., organisms observed in a pond study, in the school yard, in wildlife centres);	Bird Banquet I - 6 Twiggy Tales I - 10
-describe specific characteristics or adaptations that enable each group of vertebrates to live in its particular habitat (e.g., fish in water), and explain the importance of maintaining that habitat for the survival of the species;	Fishy Deep Freeze II - 7 The Benefit of Big III - 11 An Ice Place to Be IV - 5 Mighty Migrators IV - 6
-explain how fossils provide evidence of changes in animals over geological time;	
-compare similarities and differences between fossils and animals of the present.	

7.0 Life Systems: Grade 7 – Interactions Within Ecosystems

7.1 Overview

The study of ecosystems is an introduction to the study of ecology and involves investigation of the complex interactions between all types of organisms and their environment. Students will learn that ecosystems consist of communities of plants and animals that are dependent on each other as well as on the non-living parts of the environment. They will also learn that groups of ecosystems make up biomes, which, in turn, are components of the biosphere. In investigating ecosystems,
students will examine the effects of natural factors, such as climate changes, as well as the impact of technological changes on the environment.

7.2 Overall Expectations

By the end of Grade 7, students will:

-demonstrate an understanding of the interactions of plants, animals, fungi, and micro- organisms in an ecosystem;

-investigate the interactions in an ecosystem, and identify factors that affect the balance among the components of an ecosystem (e.g., forest fires, parasites);

-demonstrate an understanding of the effects of human activities and technological innovations, as well as the effects of changes that take place naturally, on the sustainability of ecosystems.

7.3 Specific Expectations

7.3.1 Understanding Basic Concepts

By the end of Grade 7, students will:

-identify living (biotic) and non-living (abiotic) elements in an ecosystem;

-identify populations of organisms within an ecosystem and the factors that contribute to their survival in that ecosystem;

Winter Survival II - 1
Fishy Deep Freeze II - 7
It's a Gasp II - 8
The Benefit of Big III - 11
Snakes and Ladders III - 15
An Ice Place to Be IV - 5
Mighty Migrators IV - 6

-identify and explain the roles of producers, consumers, and decomposers in food chains and their effects on the environment (e.g., plants as producers in ponds);

A Furry Plant? III - 2

-explain the importance of microorganisms in recycling organic matter (e.g., as decomposers);

-identify micro-organisms as beneficial (e.g., yeast) and/or harmful (e.g., bacteria or viruses that cause disease);

-interpret food webs that show the transfer of energy among several food chains, and evaluate the effects of the elimination or weakening of any part of the food web;	Winter Survival II - 1
-describe the process of cycling carbon and water in the biosphere;	Shocking Snow IV - 2 The Acid Test IV - 3
-investigate ways in which natural communities within ecosystems can change, and explain how such changes can affect animal and plant populations (e.g., changes affecting their life span, their gestation periods, or their ability to compete successfully);	Winter Survival II - 1 Snug Under the Snow II - 6 It's a Gasp II - 8 A Furry Plant? III - 2
-identify signs of ecological succession in a local ecosystem (e.g., the presence of blueberries in an area recently devastated by fire; the presence of pioneer organisms that start the process of succession in sand dunes).	

7.3.2. Developing Skills of Inquiry, Design, and Communication

By the end of Grade 7, students will:

-formulate questions about and identify the needs of various living things in an ecosystem, and explore possible answers to these questions and ways of meeting these needs (e.g., research the population levels of a species over time and predict its future levels on the basis of past trends and present conditions; determine how the structure of specific plants helps them withstand high winds, live on the surface of water, or compete for sunlight);	Snow Experiments II - 4 The Acid Test IV - 3
-plan investigations for some of these answers and solutions, identifying variables that need to be held constant to ensure a fair test and identifying criteria for assessing solutions;	Snow Experiments II - 4 The Acid Test IV - 3
-use appropriate vocabulary, including correct science and technology terminology, to communicate ideas, procedures, and results (e.g., use scientific terms such as biosphere, biome, ecosystem, species);	Snow Experiments II - 4 The Acid Test IV - 3
-compile qualitative and quantitative data gathered through investigation in order to record and present results, using diagrams, flow charts, frequency tables, bar graphs, line graphs, and stem-and-leaf plots produced by hand or with a computer (e.g., use a chart to record the number of producers and consumers in a particular habitat);	Snow Experiments II - 4 The Acid Test IV - 3
-communicate the procedures and results of investigations for specific purposes and to specific	Snow Experiments II - 4 The Acid Test IV - 3

audiences, using media works, oral presentations, written notes and descriptions, charts, graphs, and drawings (e.g., design a multimedia presentation explaining the interrelationships of biotic and abiotic elements in a specific ecosystem).

7.3.3 Relating Science and Technology to the World Outside the School

By the end of Grade 7, students will:

-investigate the impact of the use of technology on the environment (e.g., the "greenhouse effect"; redirection of water flow for human needs; use of pesticides);	Snowmobile Savvy IV - 1 Shocking Snow IV - 2 The Acid Test IV - 3
-investigate the bio-economical costs and benefits of the recycling and waste- disposal industries;	
-explain the importance of plants as sources of energy (e.g., food, fossil fuels), as producers of carbohydrates and oxygen (e.g., phytoplankton), and as habitats for wildlife;	It’s a Gasp II - 8
-describe the conditions in an ecosystem that are essential to the growth and reproduction of plants and micro-organisms, and show the connection between these conditions and various aspects of the food supply for humans;	The Acid Test IV - 3
-identify the importance of plants in the Canadian economy (e.g., in farming, forestry, drug manufacturing, the nursery industry) and describe the impact of the industrial use of plants on the environment;	Mighty Migrators IV - 6
-explain the long-term effects of the loss of natural habitats and the extinction of species (e.g., loss of diversity of genetic material, both plant and animal);	
-identify and explain economic, environmental and social factors that should be considered in the management and preservation of habitats (e.g., the need for recycling; the need for people to have employment).	Snowmobile Savvy IV - 1 Kindness That Kills IV - 4

8.0 Life Systems: Grade 8 – Cells, Tissues, Organs, and Systems

8.1 Overview

In Grade 5, students were introduced to the cell as the basic unit of life in the study of human organ systems. In Grade 8, students will continue to develop their knowledge of systems in living things, focusing on the structure and function of cells in plants and animals and on the organization of cells into tissues, organs, and organ systems.

8.2 Overall Expectations

By the end of Grade 8, students will:

-demonstrate an understanding of the basic structure and function of plant and animal cells, and describe the hierarchical organization of cells in plants and animals;

-investigate basic cellular processes and certain specialized cells in plants;

-describe ways in which study of the structure, function, and interdependence of human organ systems can result in improvements in human health.

8.3 Specific Expectations

8.3.1 Understanding Basic Concepts

By the end of Grade 8, students will:

-identify unicellular organisms (e.g., amoebae) and multicellular organisms (e.g., worms, humans);

-investigate ways in which unicellular organisms meet their basic needs (e.g., for food, movement);

-identify organelles in cells through observation (e.g., vacuole, nucleus, chloroplast) and explain their functions;

-describe, using their observations, differences in structure between plant and animal cells;

-describe the organization of cells into tissues, organs, and systems;

-explain the function of selectively permeable membranes in cells;

-describe and explain the structure and function of specialized cells and tissues in different parts of plants (e.g., in roots, stems, leaves);

-recognize that cells in multicellular organisms need to reproduce to make more cells to form and repair tissues;

-explain how the structure of the roots, stem, and leaves of a plant permit the movement of food, water, and gases;

-compare the structure of different plants (e.g., cactus, coniferous tree, moss) and show how their structure enables them to live in specific conditions;

-describe, using their observations, the movement of gases and water into and out of cells during diffusion and osmosis.

8.3.2 Developing Skills of Inquiry, Design, and Communication

By the end of Grade 8, students will:

-use a microscope accurately to find, observe, and draw microscopic objects;

-formulate questions about and identify needs related to the functioning of cells, and explore possible answers to these questions and ways of meeting these needs (e.g., design and conduct an experiment to test a hypothesis about the effect of chemicals on a unicellular organism; design and conduct an experiment to test the effectiveness of different substances in preventing cut flowers from wilting);

-plan investigations for some of these answers and solutions, identifying variables that need to be held constant to ensure a fair test and identifying criteria for assessing solutions;
-use appropriate vocabulary, including correct science and technology terminology, to communicate ideas, procedures, and results (e.g., use scientific terms such as organelle, diffusion, osmosis, selectively permeable);

-compile qualitative and quantitative data gathered through investigation in order to record and present results, using diagrams, flow charts, frequency tables, graphs, and stem-and-leaf plots produced by hand or with a computer (e.g., use a diagram to present an estimate of the number of cells in a petri dish);

-communicate the procedures and results of investigations for specific purposes and to specific audiences, using media works, oral presentations, written notes and descriptions, charts, graphs, and drawings (e.g., create a simulation illustrating movement of water and nutrients

between cells and through various organs and systems).

8.3.3 Relating Science and Technology to the World Outside the School

By the end of Grade 8, students will:

-describe the needs and functions of various cells and organs in relationship to the needs of the human body as a whole;

-describe the basic factors that contribute to the efficient functioning of the human respiratory, circulatory, digestive, excretory, and nervous systems;

-describe some ways in which the various systems in the human body are interdependent;

-describe similarities and differences in the functions of comparable structures in different Groups of Living things (e.g., compare the food intake and digestion of a unicellular organism, an invertebrate, and a vertebrate);

-describe ways in which research about cells has brought about improvements in human health and nutrition (e.g., development of medicines, immunization procedures and diets based on the needs of organs such as the heart);

-describe ways in which substances work by altering the way cells function (e.g., insulin);

-describe ways in which various types of cells contribute to the healthy functioning of the human body (e.g., red blood cells transport oxygen throughout the body);

-illustrate how blood is pushed by pressure throughout the body to carry oxygen and nutrients to cells, tissues, and organs.