

Grade 2, Cluster 0: Overall Skills and Attitudes

Students will...

Scientific Inquiry

Design Process

Overview

Cluster “0” comprises nine categories of specific learning outcomes related to skills and attitudes* involved in scientific inquiry, the design process, or both. In Kindergarten to Grade 2, students are introduced to scientific inquiry through observing and measuring. Students refine their design-process skills as they progress through the grades, gradually behaving more independently in planning, constructing, and testing objects and devices. Students also acquire key attitudes, an initial awareness of the nature of science, and other skills related to research, communication, the use of information technology, and cooperative learning.

Teachers should select appropriate contexts to introduce and reinforce the scientific inquiry and design process skills and attitudes within the thematic clusters (Clusters 1 to 4) over the course of the school year. For example, students in one Grade 1 class may focus on the development of cooperative group skills while using their senses to sort and classify objects in Cluster 2, while another class may focus on these skills while testing and evaluating the suitability of materials for a particular purpose as part of Cluster 3. To assist in planning and to facilitate curricular integration, many specific learning outcomes within this cluster are accompanied by links to specific learning outcomes in other subject areas, specifically English Language Arts (ELA) and Mathematics (Math). There are also links to Technology as a Foundation Skill Area (TFS).

* Cluster 0, Overall Skills and Attitudes specific learning outcomes for this grade are also presented as part of a Kindergarten to Grade 4 chart (separate attachment). The purpose of this chart is to provide support related to the tracking of the development of skills and attitudes across several grades.

Initiating	<p>2-0-1a. Ask questions that lead to investigations of living things, objects, and events in the immediate environment. (ELA 1.2.4, 3.1.2, 3.1.3; Math SP-I.1.2) GLO: A1, C2, C5</p> <p>2-0-1b. Make predictions based on observed patterns or on collected data. (ELA 1.1.1, 1.2.1) GLO: A1, C2</p>	<p>2-0-1c. Identify practical problems to solve in the immediate environment. GLO: C3</p>
Researching	<p>2-0-2a. Access information using a variety of sources. <i>Examples: elders, simple chapter books, concept books, CD-ROMs, Internet...</i> (ELA 1.1.2, 3.2.2 Math SP-II.1.2; TFS 2.1.1) GLO: C6</p> <p>2-0-2b. Match information to research needs. (ELA 3.2.3, 3.3.3)</p>	
Planning		<p>2-0-3a. Brainstorm, with the class, possible solutions to a practical problem; and in small groups, reach consensus on a solution to implement. (ELA 1.2.3, 2.2.2) GLO: C3, C7</p> <p>2-0-3b. Create, with the class, a plan to solve a problem or meet a need. <i>Examples: identify simple steps to follow, prepare a drawing of the object to be constructed...</i> (ELA 1.2.3) GLO: C3, C7</p> <p>2-0-3c. Develop, as a class, limited criteria to evaluate an object or device based on its function and aesthetics. GLO: C3, C7</p>
	<p>2-0-3d. Identify tools and materials to be used, and explain their choices. GLO: C2, C3, C4</p>	

	Scientific Inquiry	Design Process
Implementing a Plan (cont'd)	<p>2-0-4a. Follow simple directions, and describe the purpose of steps followed. GLO: C2</p>	<p>2-0-4b. Construct an object or device to solve a problem or meet a need. GLO: C3</p> <p>2-0-4c. Test an object or device with respect to pre-determined criteria. GLO: C3</p>
	<p>2-0-4e. Respond to the ideas and actions of others in building their own understandings. (ELA 1.1.2) GLO: C5, C7</p> <p>2-0-4f. Work in a variety of cooperative partnerships and groups. (ELA 5.2.1) GLO: C7</p> <p>2-0-4g. Verbalize questions, ideas, and intentions during classroom activities. GLO: C6</p> <p>2-0-4h. Follow given safety procedures and rules. GLO: C1</p> <p>2-0-4i. Recognize international symbols and the Canadian Safety Association signage, which provide information on the safety of substances. Include: flammable, explosive, corrosive, poisonous. GLO: C1</p>	
Observing, Measuring, Recording	<p>2-0-5a. Make, with guidance, observations that are relevant to a specific question. GLO: A1, A2, C2</p>	
	<p>2-0-5b. Use, with guidance, tools to observe, measure, and construct. <i>Examples: ruler, meter stick, pan balance, magnifying glass, bathroom scale, thermometer...</i> (Math SS-VIII.1.2) GLO: C2, C3, C5</p> <p>2-0-5c. Estimate and measure the passage of time related to minutes and hours. (Math SS-VI.1.2) GLO: C2, C3, C5</p> <p>5d. Estimate and measure length using standard units. (Math SS-I.1.2) GLO: C2, C3, C5</p> <p>2-0-5e. Record observations using written language, drawings, and, with guidance, charts. (ELA 4.1.2, 4.2.5) GLO: C2, C6</p>	

	Scientific Inquiry	Design Process
Analysing and Interpreting	<p>2-0-6a. Construct and label concrete-object graphs, pictographs, and bar graphs using 1:1 correspondence. (Math SP-III.2.2) GLO: C2, C6</p> <p>2-0-6b. Discuss data and generate new questions from displayed data. (Math SP IV.1.2) GLO: A1, A2, C2, C5</p>	
	<p>2-0-6c. Place materials and objects in a sequence or in groups using one or two attributes, and describe the system used. (Math SP-III.0.2) GLO: C2, C3, C5</p>	
Concluding and Applying	<p>2-0-7a. Propose an answer to the initial question based on their observations. (Math SP-IV.2.2) GLO: A1, A2, C2</p>	<p>2-0-7b. Propose a solution to the initial problem. GLO: C3</p> <p>2-0-7c. Identify new problems that arise. GLO: C3</p>
	<p>2-0-7d. Connect new experiences, ideas, and information with prior knowledge and experiences. (ELA 1.2.1, 2.1.2) GLO: A2</p> <p>2-0-7e. Describe, in a variety of ways, what was done and what was observed. <i>Examples: concrete materials, captioned drawings, oral language...</i> (ELA 4.1.2, 4.2.5) GLO: C6</p>	
Reflecting on Science and Technology	<p>2-0-8a. Recognize that learning can come from careful observations and investigations. (ELA 3.3.4) GLO: A1, A2, C2</p>	<p>2-0-8b. Recognize that tools are developed in response to human needs. GLO: A3, B2</p>
Demonstrating Scientific and Technological Attitudes	<p>2-0-9a. Willingly consider other people's views. GLO: C5, C7</p> <p>2-0-9b. Express enjoyment when sharing and discussing science-related experiences from daily life. GLO: C5</p> <p>2-0-9c. Take the time to repeat a measurement or observation for greater precision or detail. GLO: C5</p>	

Grade 2, Cluster 1: Growth and Changes in Animals

Overview

In Grade 2, students focus on animals to build upon their knowledge of living things (see *Grade 1, Cluster 1: Characteristics and Needs of Living Things*). All animals grow and change from birth until adulthood. Because children are interested in the changes that take place over the lifetime of different animals, observing these changes becomes a powerful learning experience for them. In their explorations of growth, students compare their own growth with the growth patterns of various animals, and they learn about the conditions needed to support healthy development. Particular attention is given to the nutritional requirements of humans.

Students will...

- 2-1-01 Use appropriate vocabulary related to their investigations of growth and changes in animals.
Include: food groups, Canada's Food Guide to Healthy Eating, offspring, adult, behaviour, life cycle, stage, life processes, as well as terms relating to life cycles studied.
GLO: B3, C6, D1
- 2-1-02 Identify and describe constant and changing characteristics of humans as they grow and develop.
Examples: eye colour remains constant, height changes...
GLO: D1, E3
- 2-1-03 Recognize that all humans do not grow and develop at the same rate.
GLO: B3, D1, E1, E3
- 2-1-04 Recognize that food is a form of energy and that healthy eating is essential for growth and development.
GLO: B3, D1, D4, E4
- 2-1-05 Identify the four food groups of Canada's Food Guide to Healthy Eating and give examples of foods from each group.
GLO: B3, E1
- 2-1-06 Plan a menu for one day based on the four food groups outlined in Canada's Food Guide to Healthy Eating.
GLO: B3, C4, D1

- 2-1-07 Recognize that foods humans eat come from plants and animals, and classify foods accordingly.
GLO: B1, B3
- 2-1-08 Recognize that all animals can have offspring, and that offspring generally resemble their parents.
GLO: D1, E1
- 2-1-09 Compare the appearance of young and mature animals of the same type.
GLO: D1, E1, E3
- 2-1-10 Compare the length of time from birth to adulthood for humans and other animals.
GLO: D1, E1
- 2-1-11 Identify and describe constant and changing characteristics of an animal as it grows and develops.
GLO: D1, E3
- 2-1-12 Describe and classify a wide range of animals according to various characteristics and behaviours.
Examples: skin covering, where they live, food they eat, day or night activity, how they move...
GLO: C2, D1, E1
- 2-1-13 Describe and compare ways in which different animals care for their offspring.
Examples: Canada geese, bears, alligators, bees...
GLO: D1, E1
- 2-1-14 Describe changes in the appearance and activity of various animals as they go through a complete life cycle.
Include: an insect, a bird, an amphibian.
GLO: D1, E3
- 2-1-15 Compare the life cycles of animals that have similar life cycles and those that have different life cycles.
Examples: bee and butterfly, gerbil and butterfly...
GLO: E1, E3
- 2-1-16 Observe and describe an animal's life processes.
Include: eating habits, movement, rest patterns, breathing.
GLO: E3
- 2-1-17 Identify and describe ways in which humans help other animals.
Examples: protecting endangered animals, feeding birds...
GLO: B1, B5

Grade 2, Cluster 2: Properties of Solids, Liquids, and Gases

Overview

When students examine materials in the world around them, they become aware of the similarities and differences in their characteristics, such as the ways materials look, feel, sound, or change. In Grade 2, students begin to develop an understanding of matter by investigating properties of solids and liquids. Gases are also introduced through an examination of the properties of air. Students investigate ways in which solids and liquids interact, and identify how the properties of solids and liquids determine their uses. Students observe how water can be made to change from one state to another and back again. Students also encounter changes of state in the study of the water cycle in *Grade 2, Cluster 4, Air and Water in the Environment*. Teachers are encouraged to help students make connections between these learning experiences.

Students will...

- 2-2-01 Use appropriate vocabulary related to their investigations of solids, liquids, and gases.
Include: solid, liquid, substance, property, mass/weight, dissolve, gas, changes of state, water vapour, freeze, melt, condense, evaporate, boil, float, sink, buoyancy.
GLO: C6, D3, D4
- 2-2-02 Identify substances, materials, and objects as solids or liquids.
GLO: D3
- 2-2-03 Investigate and compare properties of familiar solids.
Include: have mass/weight, take up space, maintain their shape.
GLO: C2, D3, E1
- 2-2-04 Investigate and compare properties of familiar liquids.
Include: have mass/weight, take up space, have no definite shape.
GLO: C2, D3
- 2-2-05 Identify similarities and differences among properties of familiar solids and liquids.
GLO: D3, E1
- 2-2-06 Distinguish between solids that dissolve in water and those that do not.
Examples: sugar dissolves in water, whereas sand does not...
GLO: D3, E1

- 2-2-07 Explore interactions of familiar liquids with different surfaces, powdered solids, and other liquids, and describe how these interactions determine their uses.
GLO: A5, B1, C1, C2
- 2-2-08 Identify liquids used in the home, and describe how they are used.
Examples: milk for drinking and cooking, detergent for cleaning...
GLO: B1
- 2-2-09 Compare different materials with respect to their capacity to absorb liquids, and describe how this capacity determines their uses.
GLO: B1, C2, D3
- 2-2-10 Describe useful materials that are made by combining solids and liquids.
Examples: a drink made from crystals and water, a cake made from cake mix and water, glue made from flour and water...
GLO: B1, D3
- 2-2-11 Explore to determine that there is a substance around us called air.
GLO: A2, C2, D3, D5
- 2-2-12 Recognize that air is composed of several gases
Examples: carbon dioxide, oxygen, nitrogen, water vapour...
GLO: D3
- 2-2-13 Identify properties of gases.
Include: occupy the space not taken up by solids and liquids, have no definite shape.
GLO: D3
- 2-2-14 Explore to determine how water can be made to change from one state to another and back again.
Include: addition or removal of heat.
GLO: C2, D3, D4, E3
- 2-2-15 Recognize that the states of solids and liquids remain constant in some circumstances, but may change in other circumstances.
Examples: liquids may freeze when temperature drops, solids may melt when heated, solids remain solid when broken...
GLO: D3, E3
- 2-2-16 Describe ways humans dispose of solids and liquids to maintain a clean and healthy environment.
Examples: take used car oil and old paints to collection sites, recycle newspapers...
GLO: B5
- 2-2-17 Predict and test to determine whether a variety of materials float or sink in water.
GLO: C2, D3
- 2-2-18 Demonstrate ways to make sinking materials float and floating materials sink.
GLO: B1, C3
- 2-2-19 Use the design process to construct an object that is buoyant and able to support a given mass/weight.
GLO: C3

Grade 2, Cluster 3: Position and Motion

Overview

The study of position and motion helps children develop a sense of space as well as an understanding of the relationship between stationary and moving objects, including themselves. Through observations and the use of specific vocabulary, students develop their ability to describe the position and motion of objects and recognize the effects of pushes and pulls on the motion of an object. In exploring motion, students investigate inclined planes, and wheels and axles as types of simple machines. They determine how these simple machines make it easier to move things and how friction affects the motion of objects.

Students will...

- 2-3-01 Use appropriate vocabulary related to their investigations of position and motion.
Include: position, stationary, above, between, near, far from, next to, below, in front of, behind, to the right/left, perspective, motion, push, pull, friction, slope, inclined plane, wheel, axle, rotate, clockwise, counterclockwise.
GLO: C6, D4
- 2-3-02 Explore and describe the position of a stationary object with reference to themselves, to other objects, or to a specific area.
Include: above, between, near, far from, next to, below, in front of, behind, to the right/left.
GLO: D4
- 2-3-03 Explore and describe changes in the position of an object in relation to its original position, themselves, or another object.
GLO: D4
- 2-3-04 Explore and describe the position of an object viewed from a perspective different from one's own.
GLO: D4
- 2-3-05 Explore and describe how changing the position of one's own body affects perspective with reference to a stationary object.
GLO: D4, E3

- 2-3-06 Describe the motion of various objects and living things.
Examples: spinning, swinging, bouncing, sliding, rolling, jumping...
GLO: D1, D4
- 2-3-07 Recognize that the position and motion of an object can be changed by a push or a pull and the size of the change is related to the strength of the push or pull.
GLO: D4
- 2-3-08 Compare and describe the effects of friction on the motion of objects and humans when travelling across different surfaces.
Examples: wheels of a toy on tile, sandpaper, or foam rubber; shoes on carpet, tile, or ice...
GLO: C2, D4
- 2-3-09 Explore and describe the effects of changing the slope of an inclined plane on the downward motion of an object and the effort needed to push or pull an object upward.
GLO: C2, D4
- 2-3-10 Identify how humans use inclined planes to make motion easier.
Examples: staircase, playground slide, wheelchair ramp, ramp on a moving van...
GLO: B1, D4
- 2-3-11 Explore toys to determine how wheels and axles interact and move.
GLO: C2, D4
- 2-3-12 Recognize that the wheels of a vehicle rotate clockwise or counterclockwise depending on the direction of motion of the vehicle.
GLO: D4
- 2-3-13 Identify how humans use the wheel and axle to make movement easier.
Examples: moving dolly, wheelbarrow, cart, wagon...
GLO: B1, D4
- 2-3-14 Use the design process to construct a vehicle with wheels and axles that meets given criteria.
GLO: C3, D4

Grade 2, Cluster 4: Air and Water in the Environment

Overview

Air and water are major parts of our physical environment and are essential for life. Yet, our awareness of them is often limited largely because we identify them only in their most obvious and observable forms. Through investigations, students learn about the characteristics of air, and the various forms of water in the environment. Students continue to build their understanding of the nature of science by describing evidence of the water cycle (see *Grade 2, Cluster 2: Properties of Solids, Liquids, and Gases*) and of moving air in indoor and outdoor environments. In the process, students discover the many ways in which air and water contribute to the health and survival of living things, including themselves.

Students will...

- 2-4-01 Use appropriate vocabulary related to their investigations of air and water.
Include: wind, air current, temperature, changes of state, water cycle, freeze, melt, condense, evaporate, sources of drinking water, pollution.
GLO: C6, D4, D5
- 2-4-02 Recognize that air can move.
Include: wind, air current.
GLO: D5
- 2-4-03 Observe and identify evidence of moving air in indoor and outdoor environments.
Examples: leaves blowing, drapes moving...
GLO: B1, C2, D5
- 2-4-04 Identify positive and negative effects of changes in air temperature and air movement in indoor and outdoor environments.
GLO: B1, E3
- 2-4-05 Use the design process to construct and test a device that shows evidence of air movement.
Examples: windsock, wind chime, pinwheel, sailboat, kite...
GLO: C3

- 2-4-06 Observe and identify examples of water in the environment.
Examples: dew, frost, snow, rain, lakes, puddles, clouds, fog, perspiration...
GLO: C2, D5
- 2-4-07 Describe evidence of water changing state, and recognize that these changes are part of the water cycle.
Examples: puddles evaporating after a rainstorm, snow melting...
GLO: D4, D5, E2, E3
- 2-4-08 Investigate to determine factors that cause things to dry quickly or slowly.
Examples: air temperature, amount of moisture in the air, amount of wind...
GLO: C2, D5, E3
- 2-4-09 Identify sources of drinking water, and explain how this water is distributed in one's own and in other communities.
Examples: wells, springs, lakes, rivers are sources; pumps, pipes, aqueducts and water trucks help distribute water...
GLO: B1, D5, E2
- 2-4-10 Describe different uses of water by humans.
Examples: drinking, washing, cooking, canoeing, irrigating...
GLO: B1
- 2-4-11 Explain and appreciate the importance of clean air and water for humans, plants, and animals.
GLO: B5, D2
- 2-4-12 Identify substances that pollute air and water, and describe ways of reducing such pollution.
Examples: car exhaust, smoke, carbon monoxide, oil, house paints, and sewage...
GLO: B3, B5, D3, D5
- 2-4-13 Recognize that clean water is an increasingly scarce resource in many parts of the world, and describe consequences of a shortage of clean water.
GLO: B1, B3, B5
- 2-4-14 Record personal use of water, and identify ways in which they can reduce water usage.
Examples: rather than leaving water running while brushing teeth, turn off tap to reduce usage...
GLO: B5, C2, C5