### Cluster 1: Trees

| K-1-01 | Use appropriate vocabulary related to their investigations of trees.  
|        | Include: tree, trunk, crown, branch, leaf, needle, bark, root, seed, winter, spring, fall, summer.  
|        | GLO: C5, D1, D5  
| K-1-02 | Identify ways in which humans and other animals use trees.  
|        | Examples: humans eat apples and walnuts; birds make their homes in trees; deer eat leaves, bark, and tender twigs...  
|        | GLO: B1  
| K-1-03 | Identify and describe basic parts of a tree.  
|        | Include: trunk, crown, branch, leaf, bark, root, seed.  
|        | GLO: D1, D2  
| K-1-04 | Explore, sort, and classify leaves, using their own classification system.  
|        | Examples: size, colour, pattern, length, shape...  
|        | GLO: C2, D1, E1  
| K-1-05 | Name and describe each of the four seasons.  
|        | GLO: D6  
| K-1-06 | Recognize that some trees lose their leaves in the fall, while others do not.  
|        | GLO: D1  
| K-1-07 | Describe seasonal changes in the life of a tree.  
|        | Examples: leaves of some trees change colour and drop off in the fall...  
|        | GLO: D1

### Cluster 2: Colours

| K-2-01 | Use appropriate vocabulary related to their investigations of colours.  
|        | Include: red, yellow, blue, orange, brown, black, white, purple, green, gray, pink, mix, light, dark, match, primary colour.  
|        | GLO: C6, D3  
| K-2-02 | Sort and classify objects by colour.  
|        | GLO: C2, D3  
| K-2-03 | Compare and contrast colours using appropriate terms.  
|        | Examples: lighter than, darker than, brighter than...  
|        | GLO: C2, D3  
| K-2-04 | Order a group of objects based on a given colour criterion.  
|        | Examples: order objects of the same colour range from lightest to darkest...  
|        | GLO: C2, D3  
| K-2-05 | Predict and describe changes in colour that result from the mixing of primary colours and from mixing a primary colour with white or black.  
|        | GLO: C2, D3  
| K-2-06 | Create a colour to match a given sample by mixing the appropriate amounts of two primary colours.  
|        | GLO: C3, D3  
| K-2-07 | Explore to identify and describe colours found in their environment.  
|        | Examples: rocks, flowers, shells, blocks, crayons...  
|        | GLO: C2, D3

### Cluster 3: Paper

| K-3-01 | Use appropriate vocabulary related to their investigations of paper.  
|        | Include: characteristic, thick, thin, hard, soft, smooth, rough, absorbent, pliable.  
|        | GLO: C6, D1  
| K-3-02 | Identify kinds of paper that can be found in the classroom.  
|        | Examples: drawing paper, paper towels, paper plates, books, newspaper, cardboard, tissue paper...  
|        | GLO: B1  
| K-3-03 | Recognize that paper is most often made from trees.  
|        | GLO: D3  
| K-3-04 | Observe and compare characteristics of different kinds of paper.  
|        | Examples: compare colour, thickness, stiffness, texture...  
|        | GLO: C2, D3  
| K-3-05 | Compare characteristics of different kinds of paper that make them easy or difficult to cut, tear, or fold.  
|        | Examples: cardboard is thicker than newsprint and harder to fold...  
|        | GLO: D3, D3  
| K-3-06 | Explore to determine an appropriate kind of paper for a particular task.  
|        | Examples: paper towels are useful for soaking up spills...  
|        | GLO: B1, C3  
| K-3-07 | Use the design process to construct a paper product for a particular use.  
|        | Examples: paper cup, envelope, paper mat, box...  
|        | GLO: C3

### Overall Skills and Attitudes

- **1. Initiating**  
- **2. Researching**  
- **3. Planning**  
- **4. Implementing a Plan**  
- **5. Observing, Measuring, Recording**  
- **6. Analyzing and Interpreting**  
- **7. Concluding and Applying**  
- **8. Reflecting on Science and Technology**  
- **9. Demonstrating Scientific and Technological Attitudes**

### Design Process

1. **Identifying**  
2. **Researching**  
3. **Planning**  
4. **Implementing a Plan**  
5. **Observing, Measuring, Recording**  
6. **Analyzing and Interpreting**  
7. **Concluding and Applying**  
8. **Reflecting on Science and Technology**  
9. **Demonstrating Scientific and Technological Attitudes**

### Scientific Inquiry

- **Cluster 1: Trees**  
- **Cluster 2: Colours**  
- **Cluster 3: Paper**

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**KINDERGARTEN SCIENCE AT A GLANCE - THEMATIC CLUSTERS**

**Cluster 1: Trees**

- **K-1-01**: Use appropriate vocabulary related to their investigations of trees.
- **K-1-02**: Identify ways in which humans and other animals use trees.
- **K-1-03**: Identify and describe basic parts of a tree.
- **K-1-04**: Explore, sort, and classify leaves, using their own classification system.
- **K-1-05**: Name and describe each of the four seasons.
- **K-1-06**: Recognize that some trees lose their leaves in the fall, while others do not.
- **K-1-07**: Describe seasonal changes in the life of a tree.

**Cluster 2: Colours**

- **K-2-01**: Use appropriate vocabulary related to their investigations of colours.
- **K-2-02**: Sort and classify objects by colour.
- **K-2-03**: Compare and contrast colours using appropriate terms.
- **K-2-04**: Order a group of objects based on a given colour criterion.
- **K-2-05**: Predict and describe changes in colour that result from the mixing of primary colours and from mixing a primary colour with white or black.
- **K-2-06**: Create a colour to match a given sample by mixing the appropriate amounts of two primary colours.
- **K-2-07**: Explore to identify and describe colours found in their environment.

**Cluster 3: Paper**

- **K-3-01**: Use appropriate vocabulary related to their investigations of paper.
- **K-3-02**: Identify kinds of paper that can be found in the classroom.
- **K-3-03**: Recognize that paper is most often made from trees.
- **K-3-04**: Observe and compare characteristics of different kinds of paper.
- **K-3-05**: Compare characteristics of different kinds of paper that make them easy or difficult to cut, tear, or fold.
- **K-3-06**: Explore to determine an appropriate kind of paper for a particular task.
- **K-3-07**: Use the design process to construct a paper product for a particular use.
Cluster 1: Growth and Changes in Animals

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, C1, D1, 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: B1, E3

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, E3

2-1-11 Identify and describe constant and changing characteristics of an animal as it grows and develops.
- Examples: protecting endangered animals, feeding birds... GLO: B1, B5

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

Cluster 2: Properties of Solids, Liquids, and Gases

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: C2, D3, E1

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. 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. GLO: C3

2-2-09 Explore a home's use 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

2-2-10 Identify and describe ways in which humans help other animals.
- Examples: protecting endangered animals, feeding birds... GLO: B1, B5

Cluster 3: Position and Motion

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, right, 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 the changes in an object's position 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 the position of one's own body affects perspective with reference to a stationary object. GLO: D4, E3

2-3-06 Describe the movement of various objects and living things.
- Examples: spinning, swinging, bouncing, sliding, rolling, jumping... GLO: D1, D4, E3

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 sandpaper, or foam rubber; shoes on carpet, wire, 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 can change motion.
- 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, wheelchair, 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

Cluster 4: Air and Water in the Environment

2-4-01 Use appropriate vocabulary related to their investigations of air and water.
- Include: wind, current, temperature, changes of state, water cycle, freeze, melt, condense, evaporate, sources of drinking water, and axles. GLO: D2, 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, drags 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 movement.
- Examples: windsock, wind chime, pinwheel, sailboat, kite... GLO: C3

2-4-06 Observe and identify evidence of water in the environment.
- Examples: dew, frost, snow, rain, lakes, puddles, clouds, fog, precipitation... GLO: C2, D5

2-4-07 Describe evidence of water changing states, and recognize that these changes are part of the water cycle.
- Examples: puddles evaporating after a rainfall, snow melting... GLO: B1, D4, E5, 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 useful materials that are made by combining solids and liquids.
- Examples: a drink made from crystals and water, a cake made from flour and water, glue made from flour and water... GLO: B1, D3

2-4-11 Explain to determine that there is a substance around us called air.
- GLO: A2, C2, D3

2-4-12 Recognize that air is composed of several gases.
- Examples: carbon dioxide, oxygen, nitrogen, water vapour... GLO: C2

2-4-13 Identify properties of gases.
- Include: occupy the space not taken up by solids and liquids, have no definite shape. GLO: D4

2-4-14 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

2-4-15 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... GLO: D3, E3

2-4-16 Describe a home's use 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

2-4-17 Predict and test to determine whether a variety of materials float or sink in water. GLO: C2, D3

2-4-18 Demonstrate ways to make sinking materials float and floating materials sink. GLO: B1, C3

2-4-19 Use the design process to construct an object that is buoyant and able to support a given mass. GLO: C3
Cluster 1: Growth and Changes in Plants

3-1-01 Use appropriate vocabulary related to their investigations of growth and changes in plants.
Include: growing medium, nutrient, energy, root, stem, leaf, flowers, pollination, seed, fruit, adaptation, life cycle.

GLO: C6, D1

3-1-02 Observe, compare, and contrast the structure and appearance of several types of plants.
Examples: plants with different types of roots, trees with needles and trees with leaves...
GLO: C2, D1, E1

3-1-03 Show respect for plants as living things. GLO: B5

3-1-04 Conduct experiments to determine conditions needed for healthy plant growth.
Include: light, air, water, space, warmth, growing medium, nutrients.
GLO: A1, C2, D5

3-1-05 Recognize that a plant uses the Sun’s energy to make its own food. GLO: D1, D2, D4, E4

3-1-06 Use the design process to construct an environment that enhances plant growth. Examples: wind gardens, terrarium, cold frames...
GLO: A5, C3, D5

3-1-07 Identify the basic parts of plants and describe their functions.
Include: roots, stem, leaves, flowers, pollination, ovule, pollen, seeds, fruit. GLO: D1, E2

3-1-08 Explain how different adaptations of plants help them survive in particular environments.
Examples: cacti have fleshy stems that store water, allowing them to survive in dry environments; plants with tap roots can grow well in heavily compacted soil...
GLO: D1, D2, E1

3-1-09 Identify plant adaptations that can be harmful to humans, and describe their effects.
Examples: rose thorns cause painful punctures, poison in rhubarb leaves can cause sickness and death...
GLO: B3, C1, D1

Cluster 2: Materials and Structures

3-2-01 Use appropriate vocabulary related to their investigations of materials and structures.
Include: strength, balance, stability, structure, frame structure, human-built structure, force. GLO: C6, D3

3-2-02 Conduct experiments to compare the strength of common materials.
Examples: wooden toothpicks, plastic straws, paper, cardboard, polyurethane foam...
GLO: A1, A2, C2, D3

3-2-03 Explore to determine ways to strengthen a material used for building. Include: changing shape, bulk, and number of layers.
GLO: B1, C2, C3

3-2-04 Explore to determine an appropriate method for joining two materials for a specific use. GLO: C2, D3

3-2-05 Recognize that balance affects the stability of a structure.
Examples: a dome roof that leans to one side is more likely to collapse than one that stands straight...
GLO: D4

3-2-06 Explore to determine ways to improve the strength and stability of a frame structure.
Examples: use of triangulation or a cross member...
GLO: C2, D4, E2

3-2-07 Identify shapes that are part of natural and human-built structures from various cultures and describe how these shapes help to provide stability and strength.
Examples: cylinders, triangles, hexagons in outdoor playstructures, hexagons in a honeycomb...
GLO: A4, D4, E2

3-2-08 Identify characteristics of materials that need to be considered when choosing materials for building structures.
Examples: strength, flexibility, durability, surface texture...
GLO: D3

Cluster 3: Forces That Attract or Repel

3-3-01 Use appropriate vocabulary related to their investigations of forces. Include: force, attract, repel, gravity, magnet, magnetize, magnetism, north pole, south pole, magnetic field, compass, electrostatic charge, static electricity, electrostatic force.
GLO: C6, D4

3-3-02 Recognize that force is a push or pull and that attraction and repulsion are characteristics of forces and laws. GLO: D4

3-3-03 Describe evidence showing that objects and living things on or near Earth are pulled toward it by a force called gravity.
GLO: A2, D4

3-3-04 Predict and test to identify materials that are attracted by magnets and those that can be magnetized. GLO: A2, C2, D4

3-3-05 Investigate to determine how to magnetize a given object.
Include: contact with another magnet, proximity to a magnet...
GLO: C3, D4

3-3-06 Investigate to determine the location of poles on a magnet, and the shape of the magnetic field around a magnet. GLO: A1, C2, D4

3-3-07 Demonstrate that opposite poles attract and like poles repel. GLO: C2, D4

3-3-08 Explain why Earth can be compared to a giant magnet. Include: Earth has a magnetic field, with poles adjacent to the geographic poles. GLO: D4, E1, E2

3-3-09 Demonstrate and explain how a compass operates by magnetism. Include: Earth’s magnetic poles attract the magnetic needle of a compass.
GLO: B1, D4

3-3-10 Describe potentially harmful effects of magnets on magnetic materials.
Examples: computers, videos, credit cards...
GLO: B1, C1, D4

3-3-11 Describe and demonstrate ways to use everyday materials to produce electrostatic charge.
Examples: rubbing feet on carpet, brushing hair, rubbing a balloon on clothes...
GLO: D4

3-3-12 Investigate to determine how electromagnets are used to attract or repel each other, and how charged materials attract or repel uncharged materials.
Examples: using charged objects to attract or repel other objects.
GLO: A3, A4, B1

3-3-13 Investigate why in problems which are associated with static electricity can be avoided or eliminated.
Examples: staying indoors when there is a lightning storm, grounding yourself before using computers, avoiding sticking your feet on carpets...
GLO: B1, C1, D4

3-3-14 Investigate to determine what happens when magnetic and electrostatic forces at different distances.
GLO: C2, D4

3-3-15 Predict and test to determine the effect of placing materials between a magnet and an attracting object or charged object.
Examples: different thicknesses of paper, glass, water, metal...
GLO: C2, C3

3-3-16 Recognize that gravitational, magnetic, and electrostatic forces can move certain objects without touching them directly.
Examples: sticks, magnets...
GLO: D3, D4

3-3-17 Distinguish between motion that is caused without contact and that which is caused by contact.
GLO: D4

3-3-18 Investigate why that use gravitational, magnetic, or electrostatic forces.
Examples: balances, magnetic compasses, latches, dust mops...
GLO: B1, D4

3-3-19 Use the design process to construct a game, toy, or useful device that uses gravitational, magnetic, or electrostatic forces.
GLO: C3, C5

Cluster 4: Soils in the Environment

3-4-01 Use appropriate vocabulary related to their investigations of soils in the environment.
Include: soil, soil component, loam, clay, sand, pebbles, organic matter, humus, rocks, soil texture, soil structure, soil water-holding capacity.
GLO: A3, D3

3-4-02 Identify and describe various components within a sample of soil from the local environment.
Examples: clay, loam, sand, pebbles, organic matter, humus, roots...
GLO: D5

3-4-03 Explore to determine ways to separate soil components. Include: sedimentation and sieving techniques.
GLO: C2, D5

3-4-04 Describe and compare components of soils samples collected at different locations and depths.
GLO: D5, E1

3-4-05 Compare the water-holding capacity of different soils.
Examples: sandy soil retains far less water than loamy soil...
GLO: D3, D5, E1

3-4-06 Describe the effect of water on different soils.
Examples: texture, cohesion, ability to hold shape...
GLO: D3, D5

3-4-07 Conduct experiments to determine how different soils affect the growth of plants.
Examples: compare the same type of plant grown in sand versus potting soil...
GLO: A1, C2, A2, D2

3-4-08 Explain the importance of understanding the characteristics of different soils.
Examples: enables farmers to determine which crops can be grown in a particular area, enables gardeners to improve plant growth, enables engineers to know what types of foundations to set for structures...
GLO: A5, B1, B5, E2

3-4-09 Identify animals found in soil and explain their importance to soil quality.
Examples: worms, insects, and mammals help to aerate the soil or increase nutrients...
GLO: B5, D5

3-4-10 Describe ways to return organic matter to the soil. Examples: composting, spreading manure on fields...
GLO: B5, B6, D5

3-4-11 Use the design process to construct a simple composer that returns organic matter to the soil.
Examples: classroom composting, left-over food, school compost for grass clippings and leaves...
GLO: B1, B5, C3, D2

3-4-12 Investigate how humans from various cultures use earth materials to make objects.
Examples: city pots, sod houses, adobe bricks, glass...
GLO: A4, B1, B4
Cluster 1: Habitats and Communities

4-1-01 Use appropriate vocabulary related to their investigations of habitats and communities. Include: habitat, physical adaptation, behavioural adaptation, traditional knowledge, technological development, population, community, food chain, food web, organism, consumer, herbivore, omnivore, carnivore, predator, prey, scavenger, GLO: C2, D2

4-1-02 Recognize that each plant and animal depends on a specific habitat to meet its needs. GLO: C2

4-1-03 Identify the components of an animal habit. Include: food, water, living space, cover/shelter. GLO: D2, E2

4-1-04 Identify physical and behavioral adaptations of animals and plants, and infer how these adaptations help them to survive in a specific habitat. Examples: ducks’ webbed feet and waterproof feathers help them dive for food in the marsh. GLO: D1, D2

4-1-05 Investigate alternate explanations of plant or animal adaptations based on traditional knowledge from a variety of cultures. GLO: A1, A4, C5

4-1-06 Investigate how technological developments often mirror physical adaptations. Examples: fishnet—spider web, diving fins—webbed feet. GLO: C2, D2

4-1-07 Investigate and describe a variety of local and regional habitats and their associated populations of plants and animals. GLO: D2, E4

4-1-08 Predict and test to determine an appropriate method for measuring a plant population within a given habitat. GLO: A2, C2, C3, C5

4-1-09 Recognize that plant and animal populations interact within a given community. GLO: D2

4-1-10 Recognize that the food chain is a system in which some of the energy from the Sun is transferred eventually to animals. GLO: D2, D4, E2

4-1-11 Construct food chains and food webs, and classify organisms according to their roles. Include: producer, consumer, herbivore, omnivore, carnivore, predator, prey, scavenger. GLO: D2, E2

4-1-12 Use the design process to construct a model of a local or regional habitat and its associated populations of plants and animals. GLO: C3, D4

4-1-13 Predict, based on their investigations, how the removal of a plant or animal population may affect the rest of the community. Examples: if the wolves were removed from a community, the deer population may increase rapidly… GLO: D2, E2, E3

4-1-14 Investigate natural and human-caused changes to habitats, and identify resulting effects on plant and animal populations. Include: endangerment, extinction. GLO: B1, B5, D2, E3

4-1-15 Describe how their actions can help conserve plant and animal populations and their habitats. Examples: clean up a local stream to improve fish and bird habitats. GLO: B2

4-1-16 Describe how specific technological developments have enabled humans to increase their knowledge about plant and animal populations. Examples: remote coloring, time-lapse photography. GLO: A2, A3, A5

4-1-17 Recognize and appreciate how traditional knowledge contributes to our understanding of plant and animal populations and their interactions. GLO: A1, A2, A4, C8

Cluster 2: Light

4-2-01 Use appropriate vocabulary related to their investigations of light. Include: energy, reflect, absorb, transmit, artificial light, beam, intense, light source, opaque, reflect, translucent, opaqu, technological development, scientific and technological attitude. GLO: A4, B1, B6

4-2-02 Give examples of various forms of energy. Include: light, heat, food, sound. GLO: D4, E4

4-2-03 Recognize that energy is an integral part of daily life. GLO: B1, E4

4-2-04 Demonstrate that white light can be separated into colours. GLO: D3

4-2-05 Distinguish between objects that produce their own light and those that reflect light from another source. Examples: the Sun is its own light, the Moon reflects light from the Sun. GLO: A1, A2, D4

4-2-06 Identify a variety of natural and artificial light sources. Examples: candles, light bulb, fireflies, lightning, aurora borealis, laser lights. GLO: D4

4-2-07 Observe and describe properties of light. Includes: travels in a straight path, bends as it passes from one medium to another, can be reflected, can be different colours. GLO: C2, D4

4-2-08 Explore to determine different effects of materials and objects have on a light beam. Examples: prisms and water bend light; some lenses intensify light, whereas others disperse light. GLO: C2, D3, D4

4-2-09 Recognize that most objects that produce light also give off heat, and identify objects that produce light but give off little or no heat. GLO: D4

4-2-10 Classify materials as transparent, translucent, or opaque. GLO: D3, E1

Cluster 3: Rocks, Minerals, and Erosion

4-3-01 Use appropriate vocabulary related to their investigations of sound. Include: sound wave, vibration, vocal cords, pitch, loudness, sound waves, outer ear, middle ear, inner ear, brain, transmit, absorb, reflect, detect. GLO: B1, C4, D4

4-3-02 Recognize that sound is a form of energy. GLO: D4, E4

4-3-03 Recognize that energy makes things happen and can be found all around us. GLO: C1, D1

4-3-04 Identify and classify various sounds using student-generated criteria. GLO: C2, D4

4-3-05 Recognize that sounds are caused by vibrations. Include: the human voice relies on the vibrations of vocal cords. GLO: D3, D4

4-3-06 Use the design process to create a musical instrument. GLO: C3, C5, D4, E2

4-3-07 Demonstrate how the pitch and loudness of sounds can be modified. Examples: difference in sound when plucking a rosea rubber band vs. a stretched rubber band… GLO: C2, D3, D4, E3

4-3-08 Observe and describe properties of sound. Include: travels in waves in all directions. GLO: D2, C2, D4

4-3-09 Describe how the human ear is designed to detect sound vibrations. Include: sound is transmitted from the outer ear to the middle ear and the inner ear, which relays messages to the brain. GLO: D1, D4

4-3-10 Recognize that there is a range of sounds that humans can and cannot hear. GLO: D1

4-3-11 Describe practices that help ensure protection of the ears and hearing. Examples: use of ear plugs in situations involving excessive noise… GLO: B3, C1

4-3-12 Describe harmful effects of high or sustained sound levels and identify potential sound hazards at home or in the community. Examples: leaf blower maichines, snowblower, stove, drone of machines. GLO: B1, B3, D3

4-3-13 Investigate how vibrations travel through solids, liquids, and gases. GLO: C3, D2, E1

4-3-14 Explore to determine the ability of materials to transmit or absorb sound. GLO: C2, D3, E1

4-3-15 Describe how materials that absorb or reflect sound are used in different situations. Examples: absorb concrete sound barriers are placed beside highways to absorb sound… GLO: B1, C1, D3

4-3-16 Describe devices that extend our ability to produce, transmit, and detect sound. Examples: amplifier, hearing aids, megaphone, ear trumpet… GLO: C3, D2, D4

4-3-17 Investigate to identify inventions related to sound, and describe their impacts on society. Examples: radio, telephone, microphone… GLO: A4, B1, B2

4-3-18 Describe the role of sound in different jobs and hobbies. Examples: physician listens to a patient’s heartbeat during a check-up, bakers identify bread by its sound… GLO: B4

4-3-19 Explain how materials are used to produce light. GLO: C2, D3, D4

4-3-20 Investigate to compare how vibrations travel in different materials. GLO: C3, D4, E3

4-3-21 Investigate to compare how vibrations travel in different materials. GLO: C3, D4, E3

4-3-22 Classify rocks and minerals according to student-generated criteria. Examples: small, medium, large. GLO: C2, D3, E4

4-3-23 Describe different rock and mineral properties used to identify rocks and minerals. GLO: C6, D5

4-3-24 Test to determine characteristics of rocks and minerals properties of materials, and classify accordingly. Include: hardness for hardness, streak test for colour. GLO: A1, C2, D3, E5

4-3-25 Differentiate between minerals and rocks. Include: Examples: concentrate rare earth minerals and lead is composed of lead. GLO: C2, D3, E5

4-3-26 Observe and describe properties of products derived from rocks and minerals. Examples: china, chalk, jewellery, pumice stone, drywall, talcum powder… GLO: B1, D2

4-3-27 Describe how characteristics of rocks and properties of minerals determine their uses. GLO: C3, E3

4-3-28 Observe and describe the uses of rocks and minerals to determine their uses. GLO: C3, E3

4-3-29 Recognize that there are three types of rock, and describe how each is formed. Examples: intrusive, sedimentary, metamorphic. GLO: D5

4-3-30 Explain how fossils are formed. GLO: D1, D5, E3

4-3-31 Describe how fossils help humans gain a better understanding of Earth’s history, including identifying organisms that are now extinct. Examples: great white shark… GLO: A5, E3

4-3-32 Investigate and classify materials that absorb or reflect sound in different materials. Examples: styrofoam, carpet, fabric, foam… GLO: A5, B4

4-3-33 Use the design process to determine an appropriate system for controlling soil erosion in a given situation. GLO: B1, B5, C3, E3

4-3-34 Describe effects of wind, water, and ice on the landscape. Examples: ice breaking rocks into soil, wind shaping sand dunes, waves polishing rocks on the shoreline… GLO: D5, E3

4-3-35 Identify natural phenomena and human activities that cause significant changes in the landscape. Examples: floods, avalanches, mud slides, hydroelectric dams, clearing land for agriculture, clear-cut forestry, forest fires… GLO: B5, D3, E3

4-3-36 Investigate and classify materials that absorb or reflect sound in different materials. Examples: styrofoam, carpet, fabric, foam… GLO: A5, B4
Overall Skills and Attitudes Chart Kindergarten to Grade 4 Science

This chart contains the specific student learning outcomes (SLOs) that form Cluster "0," Overall Skills and Attitudes, in Kindergarten to Grade 4 Science: Manitoba Curriculum Framework of Outcomes (Science Framework). The purpose of this chart is to provide support related to the tracking of the development of skills and attitudes across several grades.

The chart comprises nine categories of SLOs relating to scientific inquiry, the design process, or both. Teachers should select appropriate contexts to introduce and reinforce these skills and attitudes within Clusters 1 to 4 of the Science Framework over the course of the school year. To assist in planning and to facilitate curricular integration, many learning outcomes within Cluster "0" are accompanied by links to SLOs in other subject areas, specifically English Language Arts (ELA) and Mathematics (Math). There are also links to Technology as a Foundation Skill Area (TFS).

For further information, consult Kindergarten to Grade 4 Science: Manitoba Curriculum Framework of Outcomes.
### Kindergarten:

**Science Inquiry Design Process**

<table>
<thead>
<tr>
<th>Grade 1</th>
<th>Science Inquiry</th>
<th>Design Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>4a. Manipulate materials purposefully.</td>
<td>GL0: C1, C2</td>
<td></td>
</tr>
<tr>
<td>4b. Construct an object to solve a problem or meet a need.</td>
<td>GL0: C3</td>
<td></td>
</tr>
<tr>
<td>4c. Identify, with guidance, improvements to an object with respect to pre-determined criteria.</td>
<td>GL0: C3</td>
<td></td>
</tr>
</tbody>
</table>

### Grade 2:

**Science Inquiry Design Process**

<table>
<thead>
<tr>
<th>Grade 2</th>
<th>Science Inquiry</th>
<th>Design Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>4a. Follow simple directions and describe the purpose or need followed.</td>
<td>GL0: C2</td>
<td></td>
</tr>
<tr>
<td>4b. Construct an object or device to solve a problem or meet a need.</td>
<td>GL0: C3</td>
<td></td>
</tr>
<tr>
<td>4c. Test, with guidance, an object or device with respect to pre-determined criteria.</td>
<td>GL0: C2, C3</td>
<td></td>
</tr>
<tr>
<td>4d. Identify and make improvements to an object or device with respect to pre-determined criteria.</td>
<td>GL0: C3</td>
<td></td>
</tr>
</tbody>
</table>

### Grade 3:

**Science Inquiry Design Process**

<table>
<thead>
<tr>
<th>Grade 3</th>
<th>Science Inquiry</th>
<th>Design Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>4a. Carry out a plan and describe the steps followed.</td>
<td>GL0: C2</td>
<td></td>
</tr>
<tr>
<td>4b. Construct an object or device to solve a problem or meet a need.</td>
<td>GL0: C3</td>
<td></td>
</tr>
<tr>
<td>4c. Test an object or device with respect to pre-determined criteria.</td>
<td>GL0: C3, C5</td>
<td></td>
</tr>
</tbody>
</table>

### Grade 4:

**Science Inquiry Design Process**

<table>
<thead>
<tr>
<th>Grade 4</th>
<th>Science Inquiry</th>
<th>Design Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>4a. Carry out a plan and describe the purpose of the steps followed.</td>
<td>GL0: C2</td>
<td></td>
</tr>
<tr>
<td>4b. Construct an object, device, or system to solve a problem or meet a need.</td>
<td>GL0: C3</td>
<td></td>
</tr>
</tbody>
</table>

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**Students Will...**

5a. Observe using one or a combination of senses. (ELA 4.1.2, 4.2.5)

5b. Record observations using drawings. (ELA 4.1.2, 4.2.5)

5c. Estimate and measure the passage of time using non-standard units, and compare the duration of activities. (MATH SS-VIII.1.1)

5d. Estimate and measure the passage of time related to minutes and hours. (MATH SS-VIII.1.2)

5e. Record observations using written language, drawings, and, with guidance, charts. (ELA 4.1.2, 4.2.5)

---

**4. Implementing a Plan**

<table>
<thead>
<tr>
<th>Grade 1</th>
<th>Science Inquiry</th>
<th>Design Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>5a. Observe using one or a combination of senses.</td>
<td>GL0: C2</td>
<td></td>
</tr>
</tbody>
</table>

---

**5. Observing, Measuring, Recording**

5a. Observe using a combination of the senses. GL0: C2

5b. Use, with guidance, appropriate materials and tools to measure and construct. Examples: use paper clips to measure the length of objects. (MATH SS-VII.1.1)

5c. Estimate and measure the passage of time using non-standard units, and compare the duration of activities. (MATH SS-VIII.1.1)

5d. Select an appropriate non-standard unit, and estimate and measure length. (MATH SS-I.1.2)

5e. Record observations using drawings and tally charts. (ELA 4.1.2, 4.2.5; Math SP-II.1.1)

---

**5a. Make, with guidance, observations that are relevant to a specific question.** GL0: A1, A2, C2

5b. Use tools to observe, measure, and construct. Include: ruler, metric stick, pan balance, magnifying glass, thermometer, magnifier, prism, binoculars, etc. (MATH SS-VII.1.1)

5c. Estimate and measure mass/weight, length, volume, and temperature using standard units. (MATH SS-VI.1.3, SS-III.1.3, SS-VII.4.3)

5d. Estimate and measure mass/weight, length, volume, and temperature using standard units. (MATH SS-VII.4.3)

5e. Record observations in a variety of ways. Examples: point-form notes, sentences, labelled diagrams, charts... (ELA 3.2.1, 3.3.2, 4.1.3; Math SP-II.1.1, SP-VII.2.3)

5f. Record observations in a variety of ways. Examples: point-form notes, sentences, labelled diagrams, charts... (ELA 3.2.1, 3.3.2, 4.1.1, 4.1.2; Math SP-II.1.4, SP-II.2.4)

---

**5a. Select and use tools to observe, measure, and construct. Examples: tuning fork, prism, binoculars, measuring tape...** GL0: C2, C3, C5

5b. Estimate and measure mass/weight, length, volume, and temperature using standard units. (MATH SS-VII.4.1, SS-I.1.4, SS-III.1.4, SS-VI.1.4)

---

**5a. Identify problems as they arise, and work with others to find solutions.** GL0: C3, C7

4f. Assume roles, and share responsibilities as group members. (ELA 5.2.2)

4g. Communicate questions, ideas and intentions, and listen effectively to others during classroom-learning experiences. (ELA 5.2.2)

4h. Identify problems as they arise, and work with others to find solutions. (ELA 5.2.2)

4i. Recognize international symbols and the Canadian Safety Association signage, which provide information on the safety of substances. Include: flammable, explosive, corrosive, poisonous. GL0: C1

---

**5a. Make observations that are relevant to a given question.** GL0: A1, A2, C2

5b. Use tools to observe, measure, and construct. Include: ruler, metric stick, pan balance, magnifying glass, thermometer, magnifier, prism, binoculars, etc. (MATH SS-VII.1.1)

5c. Estimate and measure mass/weight, length, volume, and temperature using standard units. (MATH SS-VI.1.3, SS-III.1.3, SS-VII.4.3)

5d. Estimate and measure the passage of time using standard units. (MATH SS-VII.1.3)

5e. Record observations in a variety of ways. Examples: point-form notes, sentences, labelled diagrams, charts... (ELA 3.2.1, 3.3.2, 4.1.3; Math SP-II.1.1, SP-VII.2.3)

5f. Record observations in a variety of ways. Examples: point-form notes, sentences, labelled diagrams, charts... (ELA 3.2.1, 3.3.2, 4.1.1, 4.1.2; Math SP-II.1.4, SP-II.2.4)
<table>
<thead>
<tr>
<th>Students will...</th>
<th>Kindergarten</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>8a. Construct, with guidance, concrete-object graphs using 1:1 correspondence. (Math SP-III.2.0)</td>
<td>GLD: C2, C6</td>
<td>5a. Construct, with guidance, concrete-object graphs and pictographs using 1:1 correspondence. (Math SP-III.2.1)</td>
<td>GLD: C2, C6</td>
<td>5a. Construct and label concrete-object graphs, pictographs, and bar graphs using 1:1 correspondence. (Math SP-III.2.2)</td>
<td>GLD: C2, C6</td>
</tr>
<tr>
<td>8b. Compare data using appropriate terms. Example: more, less, same... (Math SP-IV.1.0)</td>
<td>GLD: A1, A2, C2, C5</td>
<td>5b. Compare data using quantitative terms, and ask questions about the data gathered. (Math SP-IV.1.1)</td>
<td>GLD: A1, A2, C2, C5</td>
<td>5b. Discuss data and generate new questions from displayed data. (Math SP-IV.1.2)</td>
<td>GLD: A1, A2, C2, C5</td>
</tr>
<tr>
<td>6c. Place materials and objects in a sequence or in groups using a single, self-determined attribute. (Math PR-I.1.0)</td>
<td>GLD: C2, C3, C5</td>
<td>6c. Place materials and objects in a sequence or in groups using one or two attributes, and draw conclusion about the system used. (Math SP-III.2.0)</td>
<td>GLD: C2, C3, C5</td>
<td>6c. Place materials and objects in a sequence or in groups using more than one way to represent the same data. (Math SP-III.2.3)</td>
<td>GLD: C2, C3, C5</td>
</tr>
<tr>
<td>7a. Recognize connections between new experiences and prior knowledge. (ELA 1.2.1)</td>
<td>GLO: A2</td>
<td>7a. Propose an answer to the initial question based on their observations. (Math SP-IV.2.2)</td>
<td>GLO: A1, A2, C2</td>
<td>7a. Propose a solution to the initial problem. (Math SP-IV.2.2)</td>
<td>GLO: A1, A2, C2</td>
</tr>
<tr>
<td>7b. Describe, in a variety of ways, what was done and what was observed. Example: concrete materials, drawings, oral language. (ELA 4.1.2, 4.1.3)</td>
<td>GLD: C6</td>
<td>7b. Describe, in a variety of ways, what was done and what was observed. Example: concrete materials, captions, drawings, oral language... (ELA 4.1.2, 4.1.3)</td>
<td>GLD: C6</td>
<td>7b. Describe, in a variety of ways, what was done and what was observed. Example: concrete materials, captions, drawings, oral language... (ELA 4.1.2, 4.1.3)</td>
<td>GLD: C6</td>
</tr>
<tr>
<td>8a. Recognize that learning can come from careful observations and investigations. (ELA 3.4.4)</td>
<td>GLD: A1, A2, C2</td>
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<td>GLD: A1, A2, C2</td>
<td>8a. Recognize that learning can come from careful observations and investigations. (ELA 3.4.4)</td>
<td>GLD: A1, A2, C2</td>
</tr>
<tr>
<td>8b. Recognize that tools can develop in response to human needs.</td>
<td>GLO: A3</td>
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<td>GLO: A3</td>
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<td>GLO: A3</td>
</tr>
<tr>
<td>9a. Willingly consider other people’s views.</td>
<td>GLD: C5, C7</td>
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<td>GLD: C5, C7</td>
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<td>GLD: C5, C7</td>
</tr>
<tr>
<td>9b. Willingly observe, question, and explore.</td>
<td>GLD: C5</td>
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<td>GLD: C5</td>
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<td>GLD: C5</td>
</tr>
<tr>
<td>9c. Express enjoyment of science-related classroom activities.</td>
<td>GLD: C5</td>
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<td>GLD: C5</td>
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<td>GLD: C5</td>
</tr>
<tr>
<td>9d. Take the time to measure with care.</td>
<td>GLD: C5</td>
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<td>GLD: C5</td>
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<td>GLD: C5</td>
</tr>
<tr>
<td>9e. Take the time to repeat a measurement or observation for greater precision or detail.</td>
<td>GLD: C5</td>
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<td>GLD: C5</td>
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<td>GLD: C5</td>
</tr>
<tr>
<td>9f. Listen to and consider differing opinions.</td>
<td>GLD: C5, C7</td>
<td>9f. Listen to and consider differing opinions.</td>
<td>GLD: C5, C7</td>
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<td>GLD: C5, C7</td>
</tr>
<tr>
<td>9g. Respect alternative views of the world. (ELA 5.2.3)</td>
<td>GLD: C5, C7</td>
<td>9g. Respect alternative views of the world. (ELA 5.2.3)</td>
<td>GLD: C5, C7</td>
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<td>GLD: C5, C7</td>
</tr>
<tr>
<td>9h. Demonstrate confidence in their ability to do science.</td>
<td>GLD: C5</td>
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<td>GLD: C5</td>
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<td>GLD: C5</td>
</tr>
<tr>
<td>9i. Report and record what is observed, not what they think they should observe, nor what they believe the teacher expects.</td>
<td>GLD: C5</td>
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