Grade 4 Science

70-80% of the school year should be spent on core units, and the remainder of the time should be spent on optional units or on further development of the core units. No less than 3 weeks (7.5 hours) and not more than 8 weeks (20 hours) should be spent on any core unit.

1 Core Unit: Cells and Systems **2 Core Unit: Forms of Energy**
3 Core Unit: Fossils and Rocks **4 Core Unit: Predicting Weather**
5 Optional Unit: Electricity and Magnetism **6 Optional Unit: Light**
7 Optional Unit: Nutrition and Digestion **8 Optional Unit: Plant Diversity**
9 Optional Unit: Senses **10 Optional Unit: Vertebrates and Invertebrates**

1. Core Unit: Cells and Systems (pp. 404-409 in Science: A Curriculum Guide for the Elementary Level)

1. **Explain some aspects of cell theory:**
   - ❑ 1.1 Describe the basic structure of cells.
   - ❑ 1.2 Identify cells as the smallest components of organisms.
   - ❑ 1.3 Recognize the relationships between cells, tissues, and organs.
   - ❑ 1.4 Recognize the characteristics of cells, tissues, and organs.
2. **Explain the function of the skin as an organ:**
   - ❑ 2.1 Examine the skin on the hands and arms.
   - ❑ 2.2 Describe the skin on the hands and arms.
   - ❑ 2.3 Identify the location of the hair follicles and oil glands.
   - ❑ 2.4 Compare the sweat glands with the oil glands.
   - ❑ 2.5 Describe the origin and growth of fingernails.
   - ❑ 2.6 Examine fingerprints.
   - ❑ 2.7 Study the skin in detail.

2. Core Unit: Forms of Energy (pp. 410-414 in Science: A Curriculum Guide for the Elementary Level)

1. **Identify energy in its various forms:**
   - ❑ 1.1 Identify common forms of energy.
   - ❑ 1.2 Distinguish between kinetic energy and potential energy.
   - ❑ 1.3 Show relationships between force and motion.
   - ❑ 1.4 Investigate the phenomenon of friction.
2. **Explain energy conversions and energy losses:**
   - ❑ 2.1 Give examples of conversions of energy from one form to another.
   - ❑ 2.2 Explain the loss of energy in any energy conversion.
   - ❑ 2.3 Explore the production and use of common forms of energy.

3. Core Unit: Fossils and Rocks (pp. 415-422 in Science: A Curriculum Guide for the Elementary Level)

1. Provide evidence of the Earth's history:

- ❑ 1.1 Compare igneous, sedimentary, and metamorphic rocks.
- ❑ 1.2 Explain how igneous, sedimentary, and metamorphic rocks form.
- ❑ 1.3 Explain that soil consists primarily of rock which has been broken down.

2. Describe how fossils are formed:

- ❑ 2.1 Examine the relationships between sedimentary rocks and fossils.
- ❑ 2.2 Classify fossils.
- ❑ 2.3 Produce mold and cast reproductions of a shell or other artifact.
- ❑ 2.4 Compare mold and cast reproductions to fossils.

3. Recognize how inferences are made:

- ❑ 3.1 Explain how fossil evidence can be used to make inferences about dinosaurs.
- ❑ 3.2 Explain how inferences about the Earth's history are made.

4. Core Unit: Predicting Weather (pp. 423-431 in Science: A Curriculum Guide for the Elementary Level)

1. Observe and describe weather conditions:

- ❑ 1.1 Discover how weather systems develop.
- ❑ 1.2 Determine what information is recorded on weather maps.
- ❑ 1.3 Identify instruments used to measure weather conditions.
- ❑ 1.4 Construct instruments to measure weather conditions.
- ❑ 1.5 Record measurements made with weather instruments.

2. Predict weather patterns:

- ❑ 2.1 Interpret information on weather maps.
- ❑ 2.2 Forecast weather based on cloud patterns.
- ❑ 2.3 Interpret recorded data.
- ❑ 2.4 Predict weather based on a number of different indicators.

3. Appreciate the importance of weather:

- ❑ 3.1 Suggest some reasons why people rely on accurate weather information.
- ❑ 3.2 Explain the importance of good weather to agriculture.
- ❑ 3.3 Identify some hazards associated with bad weather.
- ❑ 3.4 Describe some ways in which the weather affects human activity.
- ❑ 3.5 Describe some ways in which the weather affects other living things.

5. Optional Unit: Electricity and Magnetism (p. 432 in Science: A Curriculum Guide for the Elementary Level)

1. Recognize that electricity is a form of energy:

- ❑ 1.1 Understand the potential hazards when working with electricity.
- ❑ 1.2 Explain some ways that conversions between electricity and other forms of energy can be accomplished.
- ❑ 1.3 Identify ways in which electricity is used.
- ❑ 1.4 Explain that energy use causes demands on resources and on the environment.

- ❑ 1.5 Suggest ways in which energy can be conserved.

2. **Investigate static and current electricity:**
   - ❑ 2.1 Distinguish between conductors and insulators.
   - ❑ 2.2 Show how an object can acquire a static charge.
   - ❑ 2.3 Explain that like charges repel and unlike charges attract.
   - ❑ 2.4 Recognize some necessary components in an electric circuit.
   - ❑ 2.5 Demonstrate an ability to connect a simple electric circuit.
3. **Explore the relationship between electricity and magnetism:**
   - ❑ 3.1 Experiment with electromagnets.
   - ❑ 3.2 Compare electromagnets to permanent magnets.
   - ❑ 3.3 Discover how an electric motor works.

6. Optional Unit: Light (p. 433 in Science: A Curriculum Guide for the Elementary Level)

1. **Recognize that light is a form of energy:**
   - ❑ 1.1 Identify ways that other forms of energy can be converted into light.
   - ❑ 1.2 Investigate how light can be converted into heat.
2. **Investigate the characteristics and behaviour of light:**
   - ❑ 2.1 Develop a variety of ways to change the direction in which light travels.
   - ❑ 2.2 Observe how shadows are formed.
   - ❑ 2.3 Examine the characteristics of images in a plane mirror.
   - ❑ 2.4 Observe the refraction of light.
   - ❑ 2.5 Identify ways in which lenses are used.
   - ❑ 2.6 View the spectrum that forms when sunlight passes through a prism.
   - ❑ 2.7 Infer what happens when sunlight passes through a colour filter.
   - ❑ 2.8 Observe what happens when two different colours of light combine.
   - ❑ 2.9 Predict what will happen when coloured objects are viewed using different colours of light.
   - ❑ 2.10 Infer why objects appear to have a certain colour.

7. Optional Unit: Nutrition and Digestion (p. 434 in Science: A Curriculum Guide for the Elementary Level)

1. **Explain the function of the components of the digestive system:**
   - ❑ 1.1 Identify the main function of the following parts of the digestive system: teeth, saliva, tongue, esophagus, stomach, intestines.
   - ❑ 1.2 Explain how nutrients in food are transported throughout the body.
   - ❑ 1.3 Explain the different ways in which the body uses nutrients.
2. **Recognize the importance of nutrition to good health:**
   - ❑ 2.1 Identify some sources of food.
   - ❑ 2.2 Describe the four major food groups.
   - ❑ 2.3 Recognize the importance of a properly balanced diet.
   - ❑ 2.4 Identify the nutritive value of different foods.
   - ❑ 2.5 Identify the additives used in processed foods.
   - ❑ 2.6 Evaluate different foods based on their nutritional qualities.

- ❑ 2.7 Value the importance of foods.
- ❑ 2.8 Empathize with people throughout the world who suffer from hunger and malnutrition.
- ❑ 2.9 Appreciate the importance of agriculture in food production.

8. Optional Unit: Plant Diversity (p. 435 in Science: A Curriculum Guide for the Elementary Level)

1. **Appreciate the diversity of plants:**
   - ❑ 1.1 Examine a variety of flowering plants.
   - ❑ 1.2 Identify the main parts of a flower.
   - ❑ 1.3 Identify distinguishing characteristics of different types of flowering plants.
   - ❑ 1.4 Compare the characteristics of plants that produce seeds and plants that do not produce seeds.
   - ❑ 1.5 Compare the cones and needles of different types of coniferous trees.
   - ❑ 1.6 Examine the leaves and seeds of different types of deciduous trees.
   - ❑ 1.7 Investigate how plants are classified by their characteristics.
2. **Examine various types of plant adaptations:**
   - ❑ 2.1 Give examples of how plant adaptations help plants to survive under certain conditions.
   - ❑ 2.2 Examine plant adaptations based on food storage.
   - ❑ 2.3 Identify plant adaptations based on climatic conditions.
   - ❑ 2.4 Explain plant adaptations based on seasonal changes, the availability of water, the influence of sunlight, differences in seed dispersal, or differences in soil conditions.
   - ❑ 2.5 Identify some structural adaptations of plants.
3. **Appreciate the value of plants:**
   - ❑ 3.1 Develop a sense of respect for all living things.
   - ❑ 3.2 Explain ways in which plants enable other living things to survive.
   - ❑ 3.3 Explain how plants can be affected by changes in the environment.
   - ❑ 3.4 Simulate changes that occur with the widespread destruction of plants.
   - ❑ 3.5 Identify plants which are grown for food.
   - ❑ 3.6 Recognize the importance of plants in agriculture.

9. Optional Unit: Senses (p. 436 in Science: A Curriculum Guide for the Elementary Level)

1. **Recognize how the senses function:**
   - ❑ 1.1 Recognize the role of the brain in interpreting sensory information.
   - ❑ 1.2 Identify the main components of each of the sensory systems.
   - ❑ 1.3 Explain how each of the sense organs responds to external stimuli.
2. **Recognize the need to protect the senses:**
   - ❑ 2.1 Identify how the senses can be damaged.
   - ❑ 2.2 Recognize that damage to the senses may not be reversible.
   - ❑ 2.3 Suggest safety precautions which protect the senses from damage.
3. **Develop compassion and understanding for others:**
   - ❑ 3.1 Recognize that damage to the senses may cause permanent or temporary impairment.
   - ❑ 3.2 Identify ways that people adjust to living with a sensory impairment.
   - ❑ 3.3 Appreciate that people with sensory impairments should be treated with dignity and respect.

- ❑ 3.4 Empathize with others.

10. Optional Unit: Vertebrates and Invertebrates (p. 437 in Science: A Curriculum Guide for the Elementary Level)

1. Investigate how the animal kingdom has been classified:

- ❑ 1.1 Explain the purpose of a classification system.
- ❑ 1.2 Recognize that things can be classified in many different ways.
- ❑ 1.3 Explain that the animal kingdom can be sub-divided into vertebrates and invertebrates.
- ❑ 1.4 Compare body structures of vertebrates and invertebrates.

2. Investigate how animals depend on each other:

- ❑ 2.1 Identify animals that form social groups.
- ❑ 2.2 Identify animals that form symbiotic relationships.
- ❑ 2.3 Explain why groupings and relationships are advantageous to animals.

3. Appreciate the diversity of animals:

- ❑ 3.1 Classify vertebrates.
- ❑ 3.2 Recognize distinguishing characteristics among vertebrates.
- ❑ 3.3 Classify invertebrates.
- ❑ 3.4 Recognize distinguishing characteristics among invertebrates.