

**CURRICULUM**

**GUIDE**

Science – Grade 7

Providence  
Schools

## UNIT A

### Content students have to learn

### Processes students will learn and use

#### Unit A.1 – Characteristics of Organisms (4 days)

- Observe, describe, and chart growth and motion of living organisms.
- Describe the characteristics of living organisms.
- Describe the characteristics of nonliving objects.

- » Design, conduct, and present an investigation.
- » Demonstrate safe and ethical practices during classroom investigations.
- » Use scientific thinking processes to conduct investigations and build explanations: observing, citing evidence, communicating, comparing, measuring, and organizing.

#### Unit A.2 – Scientific Tools: Microscopes (5 days)

- Understand that a microscope can be used to observe the details of an object that cannot be seen with the naked eye.
- Make observations using a microscope.
- Describe, observe, draw, and label objects under a microscope.

- » Conduct investigations and make observations of organisms.
- » Use appropriate tools and techniques to gather, analyze, and interpret data.
- » Draw and label diagrams to scale of microscopic organisms.
- » Record and communicate observations of organisms.
- » Demonstrate safe practices during classroom investigations.

#### Unit A.3 – Microscopic Organisms (6 days)

- Observe and describe the cells in an organism.
- Compare and contrast individual cells of organisms and recognize their similarities.
- Understand how cells work together to perform specific functions.
- Describe the motions and responses of living organisms.
- Understand that cells are living organisms.

- » Investigate the structures and behaviors of an organism.
- » Conduct a scientific investigation and make observations.
- » Demonstrate safe and ethical practices during classroom investigations.
- » Use scientific thinking processes to conduct investigations and build explanations.

#### Unit A.4 – Human Cells (5 days)

- Explain how individual cells have the same survival needs as an organism.
- Describe how different organisms have mechanisms that work in a coordinated way.

- » Design and conduct investigations and observations.
- » Record and communicate observations of organisms.
- » Demonstrate safe and ethical practices during investigations.
- » Use scientific and thinking processes to conduct investigations and collect evidence.

## UNIT A

### Content students have to learn

### Processes students will learn and use

#### Unit A.5 – Life Cycles of Plants

(4 days)

- Observe, describe, and chart the growth of living organisms.
- Describe why a cell has the same survival needs as an organism.
- Understand that organisms (plants and animals) contain structures that allow them to grow.

- » Describe the different cells and functions of an organism.
- » Design and conduct a scientific investigation.
- » Collect data, record evidence, and draw conclusions from investigations.
- » Demonstrate safe and ethical practices during investigations.

#### Unit A.6 – Process of Transpiration

(5 days)

- Explain that specialized cells perform specialized functions.
- Compare individual cells of tissues and recognize the similarities of cells.
- Explain how each type of cell, tissue, and organ has a distinct structure and set of functions.

- » Design and conduct an investigation to determine what happens during transpiration.
- » Monitor, record, and communicate observations.
- » Demonstrate safe and ethical practices during investigations.
- » Use scientific thinking to conduct investigations and build explanations.

#### Unit A.7 – Plant Reproduction

(4 days)

- Describe reproduction as a process that combines the genetic material of two parents to produce a new organism.
- Describe the reproductive structures of plants.
- Explain how different structures and characteristics contribute to an organism's survival.

- » Examine a variety of seeds to discover their dispersal mechanisms.
- » Observe, monitor, and record observations of organisms over time.
- » Conduct a scientific investigation.
- » Demonstrate safe and ethical practices during investigations.
- » Use scientific thinking to conduct investigations.

#### Unit A.8 – Adaptations of Organisms

(6 days)

- Explain that specialized cells have specialized functions.
- Understand that organisms exhibit adaptations that enhance their chances to survive and reproduce in an ecosystem.
- Describe how each type of cell, tissue, and organ can have a distinct structure and set of functions.

- » Observe organisms to identify several behavioral and structural adaptations.
- » Design and conduct scientific investigations to evaluate adaptations.
- » Make inferences about the habitat of the organisms based on characteristics.
- » Develop descriptions and explanations using evidence.
- » Think critically and logically to make connections between evidence and explanation.
- » Demonstrate safe and ethical practices in scientific investigations.

## UNIT A

### Content students have to learn

### Processes students will learn and use

#### Unit A.9 – Classification

(9 days)

- Describe how similar characteristics, internal and external, can be used to classify organisms.
- Describe early classification systems.
- Explain the binomial nomenclature system used to name organisms.
- Demonstrate how to use a dichotomous key.
- Understand that classification systems show relationships among organisms.

- » Use real-world examples of classification.
- » Construct and use models to show classification.
- » Design and conduct a scientific investigation.
- » Collect data and record observations.
- » Communicate valid conclusions supported by data.

#### Unit A.10 – Sexual and Asexual Reproduction

(11 days)

- Explain the process of reproduction as the way that new individuals receive genetic material.
- Describe different types of asexual reproduction.
- Describe sexual reproduction as the process that results in a new individual with genetic material from two different parents.
- Explain differences between asexual and sexual reproduction.
- Understand that sexual reproduction results in a greater variety of organisms than asexual reproduction.

- » Use real-world examples.
- » Construct and use models.
- » Implement experimental procedures.
- » Collect and interpret data.
- » Communicate valid conclusions supported by data.

#### Unit A.11 – Human Heredity

(9 days)

- Demonstrate that traits are passed on from both parents to the offspring.
- Identify characteristics in organisms that are inherited and characteristics that result from interactions with the environment.
- Understand that specific traits in a pedigree can be traced back through generations.
- Identify the nucleus as the cellular structure responsible for containing genetic material.

- » Use real-world examples.
- » Construct and use models.
- » Implement experimental procedures.
- » Collect and interpret data.
- » Communicate valid conclusions supported by data.

#### Unit A.12 – Genetic Evolution

(10 days)

- Understand that genetic traits are inherited through random reproduction or selective breeding.
- Identify evidence for evolutionary relationships between organisms from the past and those of today.
- Describe how natural selection can lead to the evolution of a species.
- Explain how the contributions of scientists lead to our current understanding of how species originate or become extinct.
- Explain the difference between acquired and inherited traits.

- » Use hands-on materials to manipulate variables in order to explore, identify, and analyze the major concepts in genetics and evolution.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and record results to arrive at valid scientific conclusions.

## UNIT B

### Content students have to learn

### Processes students will learn and use

#### Unit B.1 – Earth Processes (12 days)

- Describe the hypothesis of continental drift (plate tectonics).
- Identify evidence that continents have changed over time and continue to change.
- Understand that the effects of continental drift have formed many land features of the earth.
- Explain the processes of weathering.
- Identify the effects of weathering on the earth's features.
- Explain the effects of water on landforms.

- » Use real-world examples of earth processes.
- » Construct and use models showing earth processes.
- » Design and conduct a scientific investigation.
- » Collect data and record observations.
- » Communicate valid conclusions supported by data.

#### Unit B.2 – Calculating Speed (8 days)

- Understand how to calculate speed using measurements of distance and time.
- Solve an equation for speed given the variables for distance and time.
- Differentiate among speed, velocity, and acceleration.

- » Determine the overall effect of multiple forces on the position, speed, and direction of motion of objects.
- » Design and conduct a scientific investigation.
- » Use appropriate techniques to gather, analyze, and interpret data.
- » Develop explanations and predictions using evidence.
- » Think critically and logically to make connections between evidence and explanations.

#### Unit B.3 – Analyzing Speed (10 days)

- Acquire distance and time data to determine speed.
- Solve for an unknown in the expression for speed given values for the distance and time variables.
- Calculate speed and graphically represent the data.
- Analyze and represent speed to solve problems.

- » Acquire data to determine speed for different values.
- » Design and conduct a scientific investigation.
- » Use appropriate techniques to gather, analyze, and interpret data.
- » Develop explanations and predictions using evidence.
- » Think critically and logically to make connections between evidence and explanation.

#### Unit B.4 – Acceleration (9 days)

- Measure distance and time for a moving object.
- Understand that the acceleration of an object is proportional to the force on the object.
- Identify and interpret graphs to explain accelerating motion.

- » Interpret acceleration as changing velocity and learn ways to determine acceleration from displacement and time data.
- » Design and conduct a scientific investigation.
- » Use appropriate techniques to gather, analyze, and interpret data.
- » Identify questions that can be answered through scientific investigations.

## UNIT B

### Content students have to learn

### Processes students will learn and use

#### Unit B.5 – Relationship Between Force and Motion (5 days)

- Understand how unbalanced forces act on the speed or direction of the motion of an object.
- Explain why the acceleration of an object is proportional to the force on the object.
- Understand the difference between mass and weight.

- » Analyze forces, the ways they interact, and their effects.
- » Design and conduct a scientific investigation.
- » Use appropriate techniques to gather, analyze, and interpret data.
- » Collect data and record observations.
- » Think critically and logically to make connections between evidence and explanation.

#### Unit B.6 – Gravity (7 days)

- Understand how unbalanced forces act on the speed or direction of motion of an object.
- Explain why the acceleration of an object is proportional to the force on the object.
- Understand gravity as a universal force of attraction between masses.

- » Describe how gravity pulls objects to Earth with predictable acceleration.
- » Design and conduct a scientific investigation.
- » Use appropriate techniques to gather, analyze, and interpret data.
- » Collect data and record observations.
- » Think critically and logically to make connections between evidence and explanation.

#### Unit B.7 – Energy Transformation (16 days)

- Explain the transfer of energy from potential energy to kinetic energy.
- Use models to explain the transformation of energy from one form to another.
- Explain that energy can be stored, transferred, or transformed, but that the total amount of energy is conserved.

- » Use real-world examples of energy transformation.
- » Construct and use models showing energy transformations.
- » Design and conduct a scientific investigation.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and record observations.
- » Communicate valid conclusions supported by data.

#### Unit B.8 – Energy Transfer (13 days)

- Describe how the motion of molecules differs when the molecules are in a warmer state versus a cooler state.
- Explain the difference between conduction, convection, and radiation.
- Explain how heat energy travels in different directions by convection, conduction, and radiation.
- Explain how heat energy travels through different materials by convection, conduction, and radiation.

- » Construct and use models showing energy transfers.
- » Use analogies to explain a scientific process.
- » Design and conduct a scientific investigation.
- » Collect data and record observations.
- » Communicate valid conclusions supported by data.

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