CURRICULUM GUIDE

Science – Grade 8

Providence Schools

UNIT A

Content students have to learn	Processes students will learn and use
Unit A.1 – Climate **(9 days)**	
• Explain the relationship between global climate and energy transfer. • Use evidence to predict future issues associated with global climate change.	» Manipulate variables during lab activities. » Organize and sequence cause and effect. » Conduct investigations and build explanations using scientific thinking processes. » Analyze data and make predictions.
Unit A.2 – Life Cycle of an Organism **(4 days)**	
• Explain that organisms have roles that contribute to each other's survival. • Understand that all living organisms have identifiable structures and characteristics. • Identify how different structures and behaviors of an organism contribute to stability in the ecosystem.	» Determine, collect, and organize relevant information about organisms. » Design and conduct a scientific investigation. » Develop descriptions, explanations, and predictions using evidence. » Use problem-solving strategies appropriately. » Think critically and logically to make relationships between evidence and explanations. » Demonstrate safe and ethical practices during investigations.
Unit A.3 – Components of an Ecosystem **(5 days)**	
• Understand the difference between biotic and abiotic elements of an ecosystem. • Identify biotic and abiotic factors in an ecosystem. • Analyze how biotic and abiotic factors are interacting systems.	» Compare and contrast biotic and abiotic systems. » Use scientific thinking processes to conduct investigations. » Develop descriptions, explanations, and predictions using evidence. » Use appropriate techniques to gather, analyze, and interpret data. » Demonstrate safe and ethical practices during classroom observations.
Unit A.4 – Comparing Ecosystems **(4 days)**	
• Understand which biotic and abiotic factors affect a given ecosystem. • Analyze how biotic and abiotic factors affect a given ecosystem. • Explain how organisms interact given a change in their environment.	» Compare the characteristics of biotic and abiotic components in aquatic and terrestrial mini-ecosystems. » Design and conduct a scientific investigation. » Collect data and record observations. » Demonstrate safe and ethical practices during classroom investigations. » Use scientific thinking processes to conduct investigations and build explanations.

Content students have to learn	Processes students will learn and use
Unit A.5 – Interdependence in Ecosystems (6 days)	
• Explain that organisms have roles that contribute to each other's survival. • Distinguish between biotic and abiotic factors that affect a given ecosystem. • Understand how abiotic factors affect an ecosystem. • Investigate and document the behavior of living organisms in an ecosystem. • Explain a model that traces the flow of energy in a food web.	» Analyze and compare the organisms and abiotic factors in an ecosystem. » Monitor, record, and communicate observations of organisms in an ecosystem. » Conduct a scientific investigation. » Demonstrate safe practices during investigations. » Use scientific thinking processes to conduct investigations.
Unit A.6 – Energy Transformation (7 days)	
• Understand the process of energy flow in an ecosystem. • Explain the transfer of the sun's energy through living systems. • Describe the basic process of photosynthesis. • Interpret a model that traces the flow of energy in a food web.	» Analyze data to confirm that organisms require water, carbon dioxide, and light. » Conduct a scientific investigation. » Use appropriate techniques to gather, analyze, and interpret data. » Demonstrate safe practices during classroom investigations. » Use scientific thinking processes to conduct investigations and build explanations.
Unit A.7 – Populations (6 days)	
• Explain that organisms have roles that contribute to each other's survival. • Analyze how biotic and abiotic factors affect populations in a given ecosystem. • Explain the transfer of the sun's energy through living systems and its effect upon them. • Identify which biotic and abiotic factors affect a given ecosystem. • Understand why biotic and abiotic elements could limit the size of a population in an ecosystem.	» Design and conduct scientific investigations. » Investigate and analyze evidence in an organism. » Demonstrate safe practices during classroom investigations. » Use scientific thinking processes to conduct investigations and explanations.
Unit A.8 – Basic Genetics (6 days)	
• Understand that reproduction is a process that combines the genetic material of two parents to produce a new organism. • Understand that reproduction is the fundamental process by which the new individual receives genetic information from parents. • Explain how genetic variations are passed on through reproduction and random genetic changes. • Learn the basic genetic mechanisms that determine the traits expressed by individuals in a population.	» Design and conduct a scientific investigation to determine genetic traits. » Use appropriate techniques to gather, analyze, and interpret data. » Demonstrate safe practices during classroom investigations. » Think critically and logically to articulate relationships between evidence and explanations.

Content students have to learn	Processes students will learn and use
Unit A.9 – Natural Selection (8 days)	
• Understand that genetic variations and traits of organisms are passed on through reproduction. • Understand that environmental factors put selective pressure on populations. • Explain how natural selection leads to evolution. • Explain why members of a species are all the same kind of organisms and are different from all other kinds of organisms.	» Conduct scientific investigations. » Use appropriate techniques to gather and interpret information. » Develop descriptions, explanations, and predictions using evidence. » Think critically and logically to articulate relationships between evidence and explanations.
Unit A.10 – Adaptations in Animals (6 days)	
• Understand that adaptations are specific to a role in an ecosystem. • Understand how organisms have roles that contribute to each other's survival. • Understand that genetic variations are passed on through random genetic changes. • Understand how natural selection leads to evolution. • Recognize that the characteristics of an organism result from interactions with the environment.	» Explain how adaptations help organisms survive in a specific environment. » Identify and describe adaptations in an ecosystem. » Monitor and record observations of scientific investigations. » Demonstrate safe and ethical practices during classroom investigations.
Unit A.11 – Human Development (12 days)	
• Identify the function of the human reproductive system. • Describe the stages in the fertilization of the human egg. • Explain the major events in the development of an embryo and fetus and compare them to similar stages in other species. • Describe the developmental stages of infancy, childhood, adolescence, and adulthood and compare them with the developmental stages of other life forms.	» Construct a model of the early stages of human development. » Research embryonic stages of human development. » Participate in safe and appropriate laboratory activities and investigations. » Collect data and record results and observations.
Unit A.12 – Factors Affecting Human Body Systems (8 days)	
• Predict the impact of biotic factors on human body systems. • Explain how the body responds to an infection. • Explain the impact of abiotic factors on human body systems. • Describe the impact of biotic factors on human health.	» Manipulate variables during lab activities. » Organize and sequence cause and effect. » Research and report findings. » Analyze data and make predictions.

UNIT B

Content students have to learn	Processes students will learn and use
Unit B.1 – Substances **(5 days)**	
• Understand that an unknown substance can be identified by its properties. • Classify substances using their characteristic properties. • Explain how to compare characteristic properties (solid, liquid, gas, metal, and nonmetal) of substances.	» Analyze characteristic properties that distinguish one substance from another. » Design and conduct a scientific investigation. » Use appropriate tools and techniques to gather, analyze, and interpret data. » Collect data and record observations. » Think critically and logically to articulate the relationships between evidence and explanation. » Demonstrate safe practices during investigations.
Unit B.2 – Elements **(4 days)**	
• Understand how to classify common elements and compounds. • Interpret the symbols and formulas of simple chemical equations. • Use symbols and chemical formulas to show simple chemical rearrangements.	» Infer that elements are the fundamental substances from which all matter is made. » Design and conduct a scientific investigation. » Use appropriate tools and techniques to gather, analyze, and interpret data. » Collect data and record observations. » Think critically and logically to articulate the relationships between evidence and explanation.
Unit B.3 – Behaviors of Gas **(4 days)**	
• Measure the volume of a gas. • Investigate the effect of compression on a gas. • Describe the composition of a gas based on its individual particles. • Investigate the property of gas as particles that are in constant motion.	» Design and conduct a scientific investigation. » Use appropriate tools and techniques to gather, analyze, and interpret data. » Make careful and accurate measurements. » Collect data and record observations. » Think critically and logically to articulate the relationships between evidence and explanation. » Demonstrate safe practices during investigations.
Unit B.4 – Kinetic Energy **(4 days)**	
• Explain the effect of increased heat energy on the motion of molecules. • Explain the effect of decreased heat energy on the arrangement of molecules. • Compare substances using characteristic properties. • Understand the process of kinetic energy.	» Investigate the expansion and contraction of substances in terms of kinetic energy. » Design and conduct a scientific investigation. » Use appropriate tools and techniques to gather, analyze, and interpret data. » Make careful and accurate measurements. » Collect data and record observations. » Think critically and logically to articulate the relationships between evidence and explanation. » Demonstrate safe practices during investigations.

UNIT B

Content students have to learn	Processes students will learn and use
Unit B.5 – Energy Transfer **(5 days)**	
• Understand the physical processes of evaporation and condensation. • Describe the processes of evaporation and condensation in terms of energy transfer. • Understand why energy is conserved. • Explain why energy may be stored, transferred, or transformed.	» Conceptualize energy transfer as changes in the kinetic energy of particles. » Design and conduct a scientific investigation. » Use appropriate tools and techniques to gather, analyze, and interpret data. » Make careful and accurate measurements. » Collect data and record observations. » Think critically and logically to articulate the relationships between evidence and explanation. » Demonstrate safe practices during investigations.
Unit B.6 – Phase Changes **(6 days)**	
• Describe changes of state in terms of molecular motion and conservation of mass. • Understand the three ordinary changes of state.	» Investigate the conditions that induce substances to change from one phase to another. » Design and conduct a scientific investigation. » Use appropriate tools and techniques to gather, analyze, and interpret data. » Make careful and accurate measurements. » Collect data and record observations. » Think critically and logically to articulate the relationships between evidence and explanation. » Demonstrate safe practices during investigations.
Unit B.7 – Solutions **(5 days)**	
• Understand the process of dissolving. • Investigate the amounts of solute and solvent needed in various solutions. • Compare various solutions.	» Investigate the macroscopic and microscopic properties and behaviors of solutions. » Design and conduct a scientific investigation. » Use appropriate tools and techniques to gather, analyze, and interpret data. » Make careful and accurate measurements. » Collect data and record observations. » Demonstrate safe practices during investigations.
Unit B.8 – Chemical Reactions **(6 days)**	
• Understand how to interpret the symbols and formulas of simple chemical equations. • Identify appropriate symbols and chemical formulas to show chemical arrangements. • Explain chemical reaction as a process in which atoms rearrange to form new substances.	» Conduct reactions and use atom models and chemical formulas to represent those reactions as equations. » Design and conduct a scientific investigation. » Use appropriate tools and techniques to gather, analyze, and interpret data. » Make careful and accurate measurements. » Collect data and record observations.

UNIT B

Content students have to learn	Processes students will learn and use
Unit B.9 – Reactants **(5 days)**	
• Understand how reactants affect products. • Understand that when substances undergo chemical changes to form new substances, the properties are different. • Explain the concept of limiting factors in chemical reactions.	» Experience chemical reactions and investigate the factors that limit reactions. » Design and conduct a scientific investigation. » Use appropriate tools and techniques to gather, analyze, and interpret data. » Make careful and accurate measurements. » Collect data and record observations.
Unit B.10 – Energy Waves **(5 days)**	
• List the colors of visible light waves in order of their increasing frequency. • Compare and contrast the differences between infrared and ultraviolet light. • Explain the differences between electromagnetic and mechanical waves.	» Apply appropriate safety measures in the classroom and laboratory. » Collect data and record results to arrive at valid scientific conclusions. » Use hands-on materials to manipulate variables in order to explore, identify, and analyze the major concepts related to light energy and light waves.
Unit B.11 – Sun, Earth, Moon **(13 days)**	
• Describe and show the rotation and revolution of the earth, sun, and moon. • Explain how the motions of the earth, sun, and moon cause seasons, years, tides, day, and night. • Describe how the positions of the earth, sun, and moon create the phases of the moon.	» Construct a model of the earth, sun, and moon and demonstrate their movement in relation to each other. » Apply appropriate safety measures in the classroom and laboratory. » Collect data and record results and observations.
Unit B.12 – Gravity **(8 days)**	
• Describe the relationship between mass and gravity. • Explain how the distances between objects affect the gravitational force between the objects. • Explain and demonstrate how mass and gravity affect the motion and position of planets and moons in the solar system.	» Collect data and record results and observations to come to valid scientific conclusions. » Make inferences about the effects of gravity.
Unit B.13 – The Universe **(10 days)**	
• Describe how major discoveries made by different scientists have resulted in our understanding of the solar system. • Describe how distance is measured in the universe. • Explain the composition and determine the age of stars. • Compare and contrast the three different types of galaxies. • Discuss theories of how the universe began.	» Formulate models. » Apply appropriate safety measures in the classroom and laboratory. » Collect data and record results and observations to arrive at valid scientific conclusions.

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