5th Grade Science Pacing Guide

Grade Level	**5th**
Subject	**Science**
Semester 1	**Quarter 1**

Standards	• **5.PS1: Matter and Its Interactions**
	  ○ Analyze and interpret data from observations and measurements of the physical properties of matter to explain phase changes between a solid, liquid, or gas.
	  ○ Analyze and interpret data to show that the amount of matter is conserved even when it changes form, including transitions where matter seems to vanish.
	  ○ Design a process to measure how different variables (temperature, particle size, stirring) affect the rate of dissolving solids into liquids.
	  ○ Evaluate the results of an experiment to determine whether the mixing of two or more substances result in a change of properties.
	• **5. PS2: Motion and Stability: Forces and Interactions**
	  ○ Test the effects of balanced and unbalanced forces on the speed and direction of motion of objects.
	  ○ Make observations and measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
	  ○ Use evidence to support that the gravitational force exerted by Earth on objects is directed toward the Earth's center.
	  ○ Explain the cause-and-effect relationship of two factors (mass and distance) that affect gravity.
	  ○ Explain how forces can create patterns within a system (moving in one direction, shifting back and forth, or moving in cycles), and describe conditions that affect how fast or slowly these patterns occur.
	Engineering, Technology, and Applications of Science (ETS) Standards are embedded throughout curriculum:
	• **5.ETS1: Engineering Design**
	  ○ Research, test, re-test, and communicate a design to solve a problem.
	• **5.ETS2: Links Among Engineering, Technology, Science, and Society**
	  ○ Identify how scientific discoveries lead to new and improved technologies.

Objectives/I Can Statements	• I can explain what happens to matter when it changes state by analyzing and interpreting data from observations and measurements. • I can analyze and interpret data to show that matter is conserved even when it changes form. • I can design a process to measure how variables affect the rate of dissolving solids into liquids. • I can describe and explain what happens when two or more substances are mixed based on the results of an experiment. • I can classify mixtures as heterogenous or homogenous solutions. • I can explain what happens to the original substance that is involved in a chemical change. • I can explain and demonstrate how forces change the direction of a moving object. • I can analyze and interpret data using patterns and evidence to prove how mass and distance affect the force of gravity between two objects.
Topics	• **Chemical and Physical Changes:** Changing States, Solutions, Types of Mixtures, Chemical Changes • **Direction and Force:** Changing Direction, Gravity

Vocabulary	• Solid, liquid, gas, state of matter, matter, change of state, vapor, evaporation, condensation, boiling, melting, freezing, substance • Solution, dissolve, mixture, homogeneous, solvent, solute, solubility, mass, combine, physical change • Heterogeneous, suspension • Chemical change, chemical, pure element, compound, element, atom, chemical reaction, detect • Motion, force, balance/unbalanced, applied forces, constant speed • Gravity, mass, weight, surface
Summary of Key Learning Events/Instruction	• The composition and structure of matter is known, and it behaves according to principles that are generally understood. • Explore different types of physical changes in matter. • Investigate different types of mixtures. • Observe and measure the simple chemical properties of common substances. • Explore how the direction of a moving object is affected by unbalanced forces. • Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents. • Use and discuss texts and other media around the following topics: *States of Matter; Physical and Chemical Changes; Mixtures and Solutions; Force and Gravity* • Conduct developmentally appropriate research and inquiry activities.
Instructional Materials/Resources	• Discovery Education Science Techbook Unit 1 • Discovery Education Science Techbook Unit 2 • www.brainpop.com • http://studyjams.scholastic.com/studyjams/ • Trade books • other resources as determined by grade level team
Assessment	• Daily assignments • Exit Tickets • Individual and group projects • Formative assessments • Summative assessments

Grade Level	**5th**
Subject	**Science**
Semester 1	**Quarter 2**

Standards	• **5.ETS1: Engineering Design**
	  ○ Research, test, re-test, and communicate a design to solve a problem.
	  ○ Plan and carry out tests on one or more elements of a prototype in which variables are controlled and failure points are considered to identify which elements need to be improved. Apply the results of tests to redesign the prototype.
	  ○ Describe how failure provides valuable information toward finding a solution.
	• **5.ETS2: Links Among Engineering, Technology, Science, and Society**
	  ○ Use appropriate measuring tools, simple hand tools, and fasteners to construct a prototype of a new or improved technology.
	  ○ Describe how human beings have made tools and machines (X-ray cameras, microscopes, satellites, computers) to observe and do things that they could not otherwise sense or do at all, or as quickly or efficiently.
	  ○ Identify how scientific discoveries lead to new and improved technologies.
	• **5.LS1: From Molecules to Organisms: Structures and Processes**
	  ○ Compare and contrast animal responses that are instinctual versus those that that are gathered through the senses, processed, and stored as memories to guide their actions.
	• **5.LS3: Heredity: Inheritance and Variation of Traits**
	  ○ Distinguish between inherited characteristics and those characteristics that result from a direct interaction with the environment. Apply this concept by giving examples of characteristics of living organisms that are influenced by both inheritance and the environment.
	  ○ Provide evidence and analyze data that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms.
	• **5.LS4: Biological Change: Unity and Diversity**
	  ○ Analyze and interpret data from fossils to describe types of organisms and their environments that existed long ago. Compare similarities and differences of those to living organisms and their environments. Recognize that most kinds of animals (and plants) that once lived on Earth are now extinct.
	  ○ Use evidence to construct an explanation for how variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction.

Objectives/I Can Statements	• I can collaborate and design investigations to solve a problem. • I can test and re-test designs to investigate how well a solution performs. • I can communicate how successes and failures of solutions provide valuable information leading to new and improved technology. • I can describe the ways that animals receive information from their environment. • I can evaluate the ways that sensory receptors are specialized for particular kinds of information. • I can explain how sensory information is processed in the brain. • I can analyze how animals are able to use their perceptions and memories to guide their actions. • I can summarize how parents pass inherited traits to their offspring. • I can draw conclusions about how heredity affects an organism's appearance and behavior. • I can compare the traits of parents and offspring.

	• I can differentiate between traits that are inherited and traits that are not inherited. • I can describe how various organisms have adapted to their habitats. • I can compare and contrast traits of organisms from different environments. • I can explain how mutations and adaptations help organisms survive. • I can explain how species respond to environmental changes. • I can explain why a species becomes extinct. • I can explain how fossils give us clues about extinct species.
Topics	• **Materials:** Building with Materials • **Using the Senses:** Receiving and Using Information • **Characteristics and the Environment:** Similarities of Parents and Offspring, Adaptation, Extinction
Vocabulary	• Structure, engineer, strength, design, prototype, flexibility, system • Information, senses, brain, sensory, nerve, nervous system, instinct, learned behavior • Offspring, traits, inherited, acquired, gene, reproduce, inherit, variation • Survive, environment, organism, adaptation, prey, species, structural adaptation, behavioral adaptation, mutation • Extinct, biodiversity, endangered species, natural disaster, population, predator, nutrients
Summary of Key Learning Events/Instruction	• Understandings about scientific inquiry and the ability to conduct inquiry are essential for living in the 21st century. • Society benefits when engineers apply scientific discoveries to design materials and processes that develop into enabling technologies. • Describe how tools, technology, and inventions help to answer questions and solve problems. • Recognize that new tools, technology, and inventions are always being developed. • Identify appropriate materials, tools, and machines that can extend or enhance the ability to solve a specified problem. • Apply a creative design strategy to solve a particular problem generated by societal needs and wants. • Describe how human beings have made tools and machines (X-ray cameras, microscopes, satellites, computers) to observe and do things that they could not otherwise sense or do at all, or as quickly or efficiently. • Compare and contrast animal responses that are instinctual versus those that are gathered through the senses, processed, and stored as memories to guide their actions. • Plants and animals reproduce and transmit hereditary information between generations. • Recognize common human characteristics that are transmitted from parents to offspring. • Explore the relationship between an organism's characteristics and its ability to survive in a particular environment. • Classify organisms as thriving, threatened, endangered, or extinct. • Use and discuss texts and other media around the following topics: *Engineering and Technology; Structures; Inventions and Design; Reproduction and Heredity* • Conduct developmentally appropriate research and inquiry activities.
Instructional Materials/Resources	• Discovery Education Science Techbook Unit 3 • Discovery Education Science Techbook Unit 4 • Discovery Education Science Techbook Unit 5 • www.brainpop.com • http://studyjams.scholastic.com/studyjams/ • Ada Twist, Scientist by Andrea Beaty

	• Iggy Peck, Architect by Andrea Beaty • Rosie Revere, Engineer by Andrea Beaty • Michigan Model of Health Resources • https://teach.genetics.utah.edu/content/heredity/ • Creature Features by Steve Jenkins and Robin Page • other resources as determined by grade level team
Assessment	• Daily assignments • Exit Tickets • Individual and group projects • Formative assessments • Summative assessments

Grade Level	**5th**
Subject	**Science**
Semester 2	**Quarter 3**

Standards	• **5.ESS.1: Earth's Place in the Universe**
	  ○ Explain that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.
	  ○ Research and explain the position of the Earth and the solar system within the Milky Way galaxy and compare the size and shape of the Milky Way to other galaxies in the universe.
	  ○ Use data to categorize different bodies in our solar system including moons, asteroids, comets, and meteoroids according to their physical properties and motion.
	  ○ Explain the cause-and-effect relationship between the positions of the sun, earth, and moon and resulting eclipses, position of constellations, and appearance of the moon.
	  ○ Use tools to describe how stars and constellations appear to move from the Earth's perspective throughout the seasons.
	  ○ Use evidence from the presence and location of fossils to determine the order in which rock strata were formed.
	• **5.ETS1: Engineering Design**
	  ○ Research, test, re-test, and communicate a design to solve a problem.
	• **5.ETS2: Links Among Engineering, Technology, Science, and Society**
	  ○ Describe how human beings have made tools and machines (X-ray cameras, microscopes, satellites, computers) to observe and do things that they could not otherwise sense or do at all, or as quickly or efficiently.
	  ○ Identify how scientific discoveries lead to new and improved technologies.

Objectives/I Can Statements	• I can summarize the characteristics of the sun. • I can explain why the sun is important to life on Earth. • I can distinguish what happens to different objects that are exposed to the sun and why. • I can explain why the sun appears larger and brighter than other stars. • I can classify stars and constellations and give examples of each. • I can explain why stars appear so small in the night sky and how telescopes help us see them better. • I can explain why stars appear to move in the sky. • I can summarize ways the stars have helped people throughout history. • I can distinguish ways that stars are different from one another. • I can describe the location of the asteroid belt and the Kuiper Belt and explain what is found in each. • I can differentiate between comets, asteroids, meteors, and meteoroids. • I can build a model of a comet and make detailed observations about it. • I can summarize the contents of a galaxy. • I can identify the shapes that galaxies can form. • I can understand that Earth and our solar system are part of the Milky Way galaxy, which is a spiral galaxy. • I can create a diagram that explains Earth's place within the universe, Milky Way galaxy, and solar system. • I can describe that Earth's surface and rocks undergo constant change. • I can classify sedimentary, metamorphic, and igneous rocks. • I can generalize that older rock layers are farther from Earth's surface. • I can compare relative and absolute rock dating. • I can state that Earth's oldest known rocks are more than four billion years old.

Topics	• **Stars and the Universe:** Our Sun, the Star; Constellations; Non-Planetary Objects; Galaxies • **Aging Earth:** Rock Dating
Vocabulary	• radiant energy, star, solar system, hydrogen, ultraviolet, filament, telescope, radiation, astronomy, transmit, energy (physical), rotate, sunspot, light, heat, universe, sundial, sun • space, axis, satellite, ancient, telescope, galaxy, orbit, season, equator, constellation, planetoid, light, focus, magnify, hemisphere • meteor, planet, Kuiper Belt, moon, comet, cirrus cloud, planetoid, meteorite, meteoroid, dwarf planet, asteroid, astronomy, cloud • hydrogen, light year, position, gravity • sediment, prehistoric, rock layer, coal, rock cycle, geology, landform, fossil, sedimentary rock, bedrock, volcano, weathering, erosion, analyze, igneous rock, earthquake, metamorphic rock, fault
Summary of Key Learning Events/Instruction	• The cosmos is vast and explored well enough to know its basic structure and operational principles. • Recognize that charts can be used to locate and identify star patterns. • Identify and compare the major components of the solar system. • Recognize that people may interpret the same results in different ways. • Describe how human beings have made tools and machines (X-ray cameras, microscopes, satellites, computers) to observe and do things that they could not otherwise sense or do at all, or as quickly or efficiently. • Use evidence from the presence and location of fossils to determine the order in which rock strata were formed. • Use and discuss texts and other media around the following topics: *Solar System, Types of Rocks, Erosion and Weathering, Fossils* • Conduct developmentally appropriate research and inquiry activities.
Instructional Materials/Resources	• Discovery Education Science Techbook Unit 6 • Discovery Education Science Techbook Unit 7 • www.brainpop.com • http://studyjams.scholastic.com/studyjams/ • other resources as determined by grade level team
Assessment	• Daily assignments • Exit Tickets • Individual and group projects • Formative assessments • Summative assessments

Grade Level	**5th**
Subject	**Science**
Semester 2	**Quarter 4**

Standards	• **5.ESS.1: Earth's Place in the Universe**
	  ○ Explain the cause-and-effect relationship between the positions of the sun, earth, and moon and resulting eclipses, position of constellations, and appearance of the moon.
	  ○ Relate the tilt of the Earth's axis, as it revolves around the sun, to the varying intensities of sunlight at different latitudes. Evaluate how this causes changes in day-lengths and seasons.
	• **5.ETS.2: Links Among Engineering, Technology, Science, and Society**
	  ○ Describe how human beings have made tools and machines (X-ray cameras, microscopes, satellites, computers) to observe and do things that they could not otherwise sense or do at all, or as quickly or efficiently.
	  ○ Identify how scientific discoveries lead to new and improved technologies.

Objectives/I Can Statements	• I can connect the fact that Earth's seasons are caused due to the tilt of Earth's axis. • I can model the position of Earth and the sun in different seasons. • I can explain why the seasons are opposite in the Northern and Southern Hemispheres. • I can know that the path of the sun is predictable from day to day and season to season. • I can explain why we see different constellations in the night sky at different times of the year. • I can differentiate and order the eight phases of the moon. • I can explain why the moon appears differently at different times of the month. • I can cite evidence to explain why the moon has phases. • I can create a model to show the phases of the moon and the moon's position in relation to the Earth and the sun. • I can explain how the relative positions of Earth, the moon, and the sun create eclipses. • I can illustrate the difference between a lunar eclipse and a solar eclipse. • I can design a simple model to illustrate eclipses.
Topics	• **Moving Earth:** Seasons, Phases of the Moon, Eclipses • **Testing Strategies/Review** • **Health and Safety**
Vocabulary	• season, tropical, orbit, radiation, planet, predict, period, equator, position, energy (physical), annual, hemisphere, radiant energy, constellation, rotate, sun, water, polar, axis, temperature (weather), revolve, air, Arctic, latitude • lunar, telescope, astronomy, Earth, phase, moon, eclipse • solid, orbit, radiation, annual, astronomy, position, light, gravity, moon, eclipse
Summary of Key Learning Events/Instruction	• Analyze patterns, relative movements, and relationships among the sun, moon, and earth. • Use and discuss texts and other media around the following topics: *Seasons, Moon and Moon Phases, Lunar and Solar Eclipses* • Conduct developmentally appropriate research and inquiry activities. • Family Life Curriculum
Instructional Materials/Resources	• Discovery Education Science Techbook Unit 8 • www.brainpop.com • http://studyjams.scholastic.com/studyjams/ • Michigan Model of Health • other resources as determined by the grade level team

Assessment	• Daily assignments • Exit Tickets • Individual and group projects • Formative assessments • Summative assessments