

Sixth Grade Science BIG IDEA Curriculum Guide

1 st quarter	2 nd quarter	3 rd quarter	4 th quarter
<p>Scientific Inquiry</p> <ul style="list-style-type: none"> • Formulate testable questions and hypothesis • Identify and describe the importance of the independent variable, dependent variables, control of constants, and multiple trials to the design of a valid experiment • Design and conduct a valid experiment • Evaluate the design of an experiment and make suggestions for reasonable improvements or extensions of an experiment • Recognize different kinds of questions suggest different kinds of scientific investigations (e.g., some involve observing and describing objects, organisms, or events; some involve collection specimens; some involve experiments; some involve making observations in nature; some involve discovery of new objects and phenomena; some involve 	<p>The Earth’s Surface</p> <ul style="list-style-type: none"> • Describe the components of soil and other factors that influence soil texture, fertility, and resistance to erosion (e.g., plant roots and debris, bacteria, fungi, worms, rodents) • Explain how the formation of sedimentary rocks depends on weathering and erosion • Describe how weathering agents and erosional processes (i.e., force of water as it freezes or flows, expansion/contraction due to temperature, force of wind, force of plant roots, action of gravity, chemical decomposition) slowly cause surface changes that create and/or change landforms • Describe how the Earth’s surface and surface materials can change abruptly through the activity of floods, rock/mudslides, or volcanoes • Explain the types of fossils and the processes by which 	<p>Rocks and Minerals</p> <ul style="list-style-type: none"> • Explain that the amount of matter remains constant while being recycled through the rock cycle • Differentiate between minerals and rocks (which are composed of different kinds of minerals) • Describe the distinguishing properties that can be used to classify minerals (i.e., texture, smell, luster, hardness, crystal shape, streak, reaction to magnets and acids) • Describe the methods used to identify the distinguishing properties of minerals • Classify rocks as sedimentary, igneous, or metamorphic • Make inferences about the formation of sedimentary rocks from their physical properties (e.g., layering and the presence of fossils indicate sedimentation) • Explain how the formation of sedimentary rocks depends on weathering and erosion • Explain how heating and cooling in the mantle layer leads to the formation of 	<p>Weather and Water</p> <ul style="list-style-type: none"> • Describe the relationship between temperature and the movement of atmospheric gases (i.e., warm air rises due to expansion of the volume of gas, cool air sinks due to contraction of the volume of gas) • Explain that the amount of matter remains constant while being recycled through the water cycle • Identify solar radiation as the primary source of energy for weather phenomena • Describe the composition of the Earth’s atmosphere (i.e., mixture of gases, water and minute particles) and how it circulates as air masses • Describe the role atmosphere (e.g., clouds, ozone) plays in precipitation, reflecting filtering light from the Sun, and trapping heat

<p>making models)</p> <ul style="list-style-type: none"> • Make qualitative observations using the five senses • Determine the appropriate tools and techniques to collect data • Use a variety of tools and equipment to gather data (e.g., microscopes, thermometers, computers, spring scales, balances, magnets, metric rulers, graduated cylinders, stopwatches) • Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, temperature to the nearest degree Celsius, force (weight) to the nearest Newton, time to the nearest second • Compare amounts/measurements • Judge whether measurements and computation of quantities are reasonable • Use quantitative and qualitative data as support for reasonable explanations (conclusions) • Use data as support for observed patterns and 	<p>they are formed (i.e., replacement, mold and cast, preservation, trace)</p> <ul style="list-style-type: none"> • Use fossil evidence to make inferences about changes on Earth and in its environment (i.e., superposition of rock layers, similarities between fossils in different geographical locations, fossils of seashells indicate the area was once underwater) • Describe the methods used to estimate geological time and the age of the Earth (e.g., techniques used to date rocks and rock layers, presence of fossils) • Use rock and fossil evidence to make inferences about the age, history, and changing life forms and environment of the Earth (i.e., changes in successive layers of sedimentary rock and the fossils contained within them, similarities between fossils in different geographic locations, similarities between fossils and organisms present today, fossils of organisms indicating changes in climate fossils of extinct organisms) • Relate the comparative 	<p>metamorphic rocks and some igneous rocks</p> <ul style="list-style-type: none"> • Make inferences about the formation of igneous and metamorphic rocks from their physical properties (e.g., crystal size indicates rate of cooling, air pockets or glassy texture indicate volcanic activity) • Explain and diagram the external and internal processes of the rock cycle (e.g., weathering and erosion, sedimentary, compaction, heating, recrystallization, resurfacing due to forces that drive plate motion) <p>Astronomy</p> <ul style="list-style-type: none"> • Classify celestial bodies in the solar system into categories: Sun, Moon, planets, and other small bodies (i.e., asteroids, comets, meteors), based on physical properties • Compare and contrast the size, composition, atmosphere, and surface of the planets (inner vs. outer) in our solar system and Earth's moon • Describe the relative proximity of common celestial bodies (i.e., Sun, Moon, planets, smaller celestial bodies such as comets and meteors, other stars) in the sky to Earth 	<p>energy emitted from the Earth's surface</p> <ul style="list-style-type: none"> • Explain and trace the possible paths of water through the hydrosphere, goesphere, and atmosphere (i.e., water cycle, evaporation, condensation, precipitation, surface run-off/groundwater flow) • Relate the different forms water can take (i.e., snow, rain, sleet, fog, clouds, dew, humidity) as it moves through the water cycle to atmospheric conditions (i.e., temperature, pressure, wind direction and speed, humidity) at a given geographic location • Explain how thermal energy is transferred throughout the water cycle by the processes of convection, conduction, and radiation • Explain how the differences in surface temperature, due to the different heating and cooling rates of water and soil, affect the temperature and movement of the air
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>relationships, and to make predictions to be tested</p> <ul style="list-style-type: none"> • Determine the possible effects of errors in observations, measurements, and calculations on the formulation of explanations (conclusions) • Evaluate the reasonableness of an explanation (conclusion) • Analyze whether evidence (data) and scientific principles support proposed explanations (hypotheses, laws, theories) • Communicate the procedure and results of investigations and explanations through: <i>Oral presentations</i> <i>Drawings and maps</i> <i>Data tables (allowing for the recording and analysis of data relevant to the experiment, such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)</i> <i>Graphs (bar, single line, pictograph)</i> <i>Writings</i> 	<p>amounts of fresh water and salt water on the Earth due to the availability of water as a resource for living organisms and human activity</p> <ul style="list-style-type: none"> • Describe the affect of human activities (e.g., landfills, use of fertilizers and herbicides, farming, septic systems) on the quality of water • Analyze the way humans affect the erosion and deposition of soil and rock materials (e.g., clearing of land, planting vegetation, paving land, construction of new buildings, building or removal of dams) and propose possible solutions • Distinguish between renewable (e.g., geothermal, hydroelectric) and nonrenewable (e.g., fossil fuel) energy sources <p>Plate Tectonics, Earthquakes, and Volcanoes</p> <ul style="list-style-type: none"> • Describe how weathering agents and erosional processes (i.e., force of water as it freezes or flows, expansion/ contraction due to temperature, force of wind, force of plant roots, 	<ul style="list-style-type: none"> • Describe how the Earth’s placement in the solar system is favorable to sustain life (i.e., distance from the Sun, temperature, and atmosphere) • Compare and contrast the characteristics of Earth that support life with the characteristics of other planets that are considered favorable or unfavorable to life (e.g., atmospheric gases, extremely high/low temperatures) • Explain that stars are separated from one another by vast and different distances, which causes stars to appear smaller than the Sun • Compare the distance light travels from the Sun to Earth to the distance light travels from other stars to Earth using light years • Relate the apparent east-to-west changes in the positions of the Sun, other stars, and planets in the sky over the course of a day to Earth’s counterclockwise rotation about its axis • 6.2.A.7b Describe the pattern that can be observed in the changes in number of hours of visible sunlight, and the time and location of sunrise and sunset, throughout the year 	<p>above</p> <ul style="list-style-type: none"> • Describe the characteristics of air masses (i.e., high/low barometric pressure, temperature) and predict the effect on the weather in a given location • Identify weather conditions associated with cold fronts and warm fronts • Identify factors that affect weather patterns in a particular region (e.g., proximity to large bodies of water, latitude, altitude, prevailing wind currents, amount of solar radiation, location with respect to mountain ranges) • Collect and interpret weather data (e.g., cloud cover, precipitation, wind speed and direction) from weather instruments and maps to explain present day weather and to predict the next day’s weather • Describe the significant changes in temperature and barometric pressure may cause dramatic weather phenomena (i.e.,
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>The Earth's Surface</p> <ul style="list-style-type: none"> Describe the components of soil and other factors that influence soil texture, fertility, and resistance to erosion (e.g., plant roots and debris, bacteria, fungi, worms, rodents) Explain how the formation of sedimentary rocks depends on weathering and erosion Describe how weathering agents and erosional processes (i.e., force of water as it freezes or flows, expansion/contraction due to temperature, force of wind, force of plant roots, action of gravity, chemical decomposition) slowly cause surface changes that create and/or change landforms Describe how the Earth's surface and surface materials can change abruptly through the activity of floods, rock/mudslides, or volcanoes Explain the types of fossils and the processes by which they are formed (i.e., replacement, mold and cast, preservation, trace) Use fossil evidence to make inferences about changes on 	<p>action of gravity, chemical decomposition) slowly cause surface changes that create and/or change landforms</p> <ul style="list-style-type: none"> Describe how the Earth's surface and surface materials can change abruptly through the activity of floods, rock/mudslides, or volcanoes Identify events (earthquakes, volcanic eruptions) and the landforms created by them on the Earth's surface that occur at different plate boundaries Explain convection currents are the result of uneven heating inside the mantle resulting in the melting of rock materials, convection of magma, eruption/flow of magma, and movement of crustal plates Explain how rock layers are affected by the folding, breaking, and uplifting of rock layers due to plate motion Describe how the movement of crustal plates can cause earthquakes and volcanic eruptions that can result in mountain building and trench formation 	<ul style="list-style-type: none"> Describe how, in the Northern Hemisphere, the Sun appears lower in the sky during the winter and higher in the sky during the summer Describe how, in winter, the Sun appears to rise in the Southeast and set in the Southwest, accounting for a relatively short day length, and, in summer, the Sun appears to rise in the Northeast and set in the Northwest, accounting for a relatively long day length Describe how the Sun is never directly overhead when observed from North America Observe the change in time and location of Moon rise, Moon set, and the Moon's appearance relative to time of day and month over several months, and note the pattern in this change Describe how the Moon rises later each day due to its revolution around the Earth in a counterclockwise direction Describe how the Moon is in the sky for roughly 12 hours in a 24-hour period (i.e., if the Moon rises at about 6 P.M., it will set at about 6 A.M) Describe how that one half of the Moon is always facing the Sun and, therefore, one half of 	<p>severe thunderstorms, tornadoes, hurricanes)</p> <ul style="list-style-type: none"> Differentiate between weather and climate Identify factors that affect climate (e.g., latitude, altitude, prevailing wind currents, amount of solar radiation) Provide examples of how the availability of fresh water for humans and other living organisms is dependent upon the water cycle
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>Earth and in its environment (i.e., superposition of rock layers, similarities between fossils in different geographical locations, fossils of seashells indicate the area was once underwater)</p> <ul style="list-style-type: none"> • Describe the methods used to estimate geological time and the age of the Earth (e.g., techniques used to date rocks and rock layers, presence of fossils) • Use rock and fossil evidence to make inferences about the age, history, and changing life forms and environment of the Earth (i.e., changes in successive layers of sedimentary rock and the fossils contained within them, similarities between fossils in different geographic locations, similarities between fossils and organisms present today, fossils of organisms indicating changes in climate fossils of extinct organisms) • Relate the comparative amounts of fresh water and salt water on the Earth due to the availability of water as a resource for living organisms and human 	<ul style="list-style-type: none"> • Use fossil evidence to make inferences about changes on Earth and in its environment (i.e., superposition of rock layers, similarities between fossils in different geographical locations, fossils of seashells indicate the area was once underwater) • Describe the methods used to estimate geological time and the age of the Earth (e.g., techniques used to date rocks and rock layers, presence of fossils) • Use rock and fossil evidence to make inferences about the age, history, and changing life forms and environment of the Earth (i.e., changes in successive layers of sedimentary rock and the fossils contained within them, similarities between fossils in different geographic locations, similarities between fossils and organisms present today, fossils of organisms indicating changes in climate fossils of extinct organisms) 	<p>the Moon is always lit</p> <ul style="list-style-type: none"> • Relate the apparent change in the Moon’s position in the sky as it appears to move east-to-west over the course of a day to Earth’s counterclockwise rotation about its axis • Describe how the appearance of the Moon that can be seen from Earth changes approximately every 28 days in an observable pattern (moon phases) • Illustrate and explain a day as the time it takes a planet to make a full rotation about its axis • Diagram the path (orbital ellipse) the Earth travels as it revolves around the Sun • Illustrate and explain a year as the time it takes a planet to revolve around the Sun • Explain the relationships between a planet’s length of year (period of revolution) and its position in the solar system • Recognize and explain the phases of the moon are due to the relative positions of the Moon with respect to the Earth and Sun • Relate the axial tilt and orbital position of the Earth as it revolves around the Sun to the intensity of sunlight falling on 	
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--

<p>activity</p> <ul style="list-style-type: none">• Describe the affect of human activities (e.g., landfills, use of fertilizers and herbicides, farming, septic systems) on the quality of water• Analyze the way humans affect the erosion and deposition of soil and rock materials (e.g., clearing of land, planting vegetation, paving land, construction of new buildings, building or removal of dams) and propose possible solutions• Distinguish between renewable (e.g., geothermal, hydroelectric) and nonrenewable (e.g., fossil fuel) energy sources		<p>different parts of the Earth during different seasons</p> <ul style="list-style-type: none">• Describe how the Earth's gravity pulls any object on or near the Earth toward it (including natural and artificial satellites)• Describe how the planets' gravitational pull keeps satellites and moons in orbit around them• Describe how the Sun's gravitational pull holds the Earth and other planets in their orbits	
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--

Within each unit of study:

- Explain how technological improvements, such as those developed for use in space exploration, the military, or medicine, have led to the invention of new products that may improve lives here on Earth (e.g., new materials, freeze-dried foods, infrared goggles, Velcro, satellite imagery, robotics, lasers)
- Identify the link between technological developments and the scientific discoveries made possible through their development (e.g., Hubble telescope and stellar evolution, composition and structure of the universe; the electron microscope and cell organelles; sonar and the composition of Earth; manned and unmanned space missions and space exploration; Doppler radar and weather conditions; MRI and CAT-scans and brain activity)
- Describe how technological solutions to problems (e.g., storm water runoff, fiber optics, windmills, efficient car design, electronic trains without conductors, sonar, robotics, Hubble telescope) can have both benefits and drawbacks (e.g., design constraints, unintended consequences, risks) (Assess Locally)
- Describe how the contributions of scientists and inventors, representing different cultures, races, and gender, have contributed to science, technology and human activity (e.g., George Washington Carver, Thomas Edison, Thomas Jefferson, Isaac Newton, Marie Curie, Galileo, Albert Einstein, Mae Jemison, Edwin Hubble, Charles Darwin, Jonas Salk, Louis Pasteur, Jane Goodall, Tom Akers, John Wesley Powell, Rachel Carson) (Assess Locally)
- Describe the difficulty science innovators experience as they attempt to break through accepted ideas (hypothesis, laws, theories) of their time to reach conclusions that may lead to changes in those ideas and serve to advance scientific understanding (e.g., Darwin, Copernicus, Newton)
- Describe explanations have changed over time as a result of new evidence
- Describe ways in which science and society influence one another (e.g., scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment; societal challenges often inspire questions for scientific research; social priorities often influence research priorities through the available funding for research)
- Identify and evaluate the physical, social, economic, and/or environmental problems that may be overcome using science and technology (e.g., the need for alternative fuels, human travel in space, AIDS)