6th Grade Science

Science					
Timeline (# of days)	**Topic**	**Standards**	**Key Vocabulary**	**Enduring Understandings**	**Essential Questions**
45	❑ Earth Science	**6.E.2.1 6.E.2.2 6.E.2.3 6.E.2.4**	Lithosphere, Asthenosphere, Crust, mantle, outer core, inner core, density, magma, magnetic field, continental crust, oceanic crust, basalt, granite, convection,boundary (transform, divergent, convergent), fault, subduction, seafloor spreading, constructive and destructive forces, Mid-Ocean Ridge, Plate Tectonics, Continental drift, trench, folded mountains, earthquake, epicenter, focus, seismic wave, P-wave, S-wave, Surface wave, retrofitting, Richter Scale, seismologist, volcano (composite, shield, cinder cone), magma, lava, Mineral, rock (igneous, sedimentary, metamorphic), rock cycle, weathering, erosion, parent material, soil, vector, soil property, sand, silt, clay, loam, humus, organic material, Stewardship, soil quality, Best Management practices, crop rotation, contour plowing, terracing, no till farming	Students will understand that… 1. Earth is comprised of different layers. 2. Earth's geographic structures are formed by the movement of tectonic plates. 3. Soil creation is a part of the rock cycle and is related to the types of parent rock. 4. Human interaction with their environments affects soil quality.	1. How does the structure of Earth impact human decisions? 2. What impact does the movement of tectonic plates have on the development of Earth's crust? 3. How do human activities affect Earth's soil quality?
40	❑ Earth in Space	**6.E.1.1 6.E.1.2 6.E.1.3**	Rotation, axis of rotation (23.5 degrees), revolution, gravity, orbit, tides (high, low,spring and neap), moon phases (waxing, waning, gibbous, crescent),	Students will understand that… 1. The positions	1. How do the motions of the Earth, moon, and sun affect us?

			solar eclipse, lunar eclipse, umbra, penumbra, solstice, equinox Gravity, astronomical unit, atmosphere,galaxy, solar system, Milky Way, meteors, comet, asteroids, star (including sun-talk about nuclear fusion at core creating heat and light), supernova, black hole Space exploration, satellites, probes, manned space shuttles, telescopes (Hubble), International Space Station, benefits/consequences, Space Race	and movement of the Earth, moon, and sun are what cause celestial cycles and events. 2. Different planets have different properties. 3. Humans benefit from space exploration	2. What adjustments would we need to live on another planet? 3. What gains are made from space exploration?
40	❑ Matter & Energy	**6.P.1.1** **6.P.1.2** **6.P.1.3** **6.P.2.1** **6.P.2.2** **6.P.2.3** **6.P.3.1** **6.P.3.2** **6.P.3.3**	wave, medium, matter, trough, crest, amplitude, compression, rarefaction, wavelength, frequency, vibration, transfer, transverse wave, longitudinal wave, Electromagnetic spectrum, sight, parts of eye; reflection, refraction, transparent, translucent, opaque, visible light, sound, parts of ear, echo, Matter, atom, element, mass, weight, volume, density, phase change (solid,liquid,gas), compound, solution, suspension, physical property, melting point, boiling point, solubility, sublimation, condensation, evaporation, heat, thermal energy, conduction, convection, radiation, conductor, insulator, electromagnetic waves, absorption, scattering, expansion, contraction	Students will understand that… 1. Light, sound and heat involve energy that travels as waves. 2. Heat involves energy that transfers from warmer to cooler objects through the collision of particles. 3. Materials conduct or insulate energy at different rates. 4. All matter is made up of atoms. 5. Atoms of the same element have the same properties. 6. Changes in states of matter occur when the motion of the atoms	1. How is it possible for matter to have different properties? 2. Why do some things float while others sink? 3. How does matter behave during phase changes? 4. How do the properties of light, sound, and heat waves compare to one another? 5. Why can I hear some things and not others? 6. What is the effect of absorption, reflection, and scattering of visible light on my vision?

				changes.	
35	❑ Life Science	**6.L.1.1** **6.L.1.2** **6.L.2.1** **6.L.2.2** **6.L.2.3**	Plant, producer, roots, stem, leaves, flower, seed, germination, stoma, transpiration, photosynthesis, chlorophyll, chloroplast, glucose, cellular respiration,carbon dioxide, oxygen, fertilization, pollination, stamen, anther, filament, stigma, style, ovary, pistil, sepal. Pollen, sperm, egg, Stimuli, Tropism, hydrotropism, gravitropism, thigmotropism, phototropism, producer, consumer, decomposer, food chain, food web, energy pyramid, Ecology, biosphere, Biome, ecosystem, biotic factors, abiotic factors, population, community, herbivore, carnivore, omnivore, detritivore, predator, prey, symbiosis, mutualism, commensalism, parasitism, niche	Students will understand that… 1. Flowering plants reproduce sexually, make their own food and respond to their environment. 2. Cellular respiration and photosynthesis are complementary processes. 3. Plants respond to external stimuli in various ways. 4. Energy from the sun travels to producers, then to consumers and decomposers. 5. Everything in an organism's environment can be classified as either biotic or abiotic. 6. An organism's survival is dependent on the interactions with the factors in its environment.	1. Why are pollinators so important to plants? 2. How do plants behave like an animal? 3. Where does my energy come from? 4. How do all the parts of the biosphere interact? 5. Why are plants so important to animals?
8-10	❑ Review				

Science

I Can Statements

6.E.2.1 Summarize the structure of the earth, including the layers, the mantle and core based on the relative position, composition and density.

I Can

- I can summarize the structure of the earth's layers based on their relative position.
- I can describe the composition of each layer of the earth.
- I can describe the earth's layers according to density.

6.E.2.2 Explain how crustal plates and ocean basins are formed, move and interact using earthquakes, heat flow and volcanoes to reflect forces within the earth.

I Can

- I can explain how crustal plates and ocean basins are formed.
- I can explain how crustal plates and ocean basins move and interact using earthquakes to reflect forces within the earth.
- I can explain how crustal plates and ocean basins move and interact using convection currents.
- I can explain how interactions between the lithosphere and asthenosphere form volcanoes.

6.E.2.3 Explain how the formation of soil is related to the parent rock type and the environment in which it develops.

I Can

- I can explain how the formation of soil is related to the parent rock type and the environment in which it develops.

6.E.2.4 Conclude that the good health of humans requires: monitoring the lithosphere, maintaining soil quality and stewardship.

I Can

- I can conclude that the good health of humans requires monitoring the lithosphere (stewardship).
- I can conclude that the good health of humans requires maintaining soil quality (stewardship).

6.E.1.1 Explain how the relative motion and relative position of the sun, Earth and moon affect the seasons, tides, phases of the moon, and eclipses.

I Can

- I can explain how the relative motion and relative position of the sun, Earth and moon cause day, night, and seasons.
- I can explain how the relative motion and relative position of the sun, Earth and moon affect tides.
- I can explain how the relative motion and relative position of the sun, Earth and moon affect phases of the moon.
- I can explain how the relative motion and relative position of the sun, Earth and moon affect eclipses.

6.E.1.2 Explain why Earth sustains life while other planets do not based on their properties (including types of surface, atmosphere and gravitational force) and location to the Sun.

I Can

- I can explain why Earth sustains life while other planets do not.

6.E.1.3 Summarize space exploration and the understandings gained from them.

I Can

- I can summarize space exploration and the understandings gained from them.

6.P.1.1 Compare the properties of waves to the wavelike property of energy in earthquakes, light and sound.

I Can

- I can explain wave properties and behaviors.
- I can compare the properties of waves to the wavelike property of energy in earthquakes
- I can compare the properties of waves to the wavelike property of energy in light.
- I can compare the properties of waves to the wavelike property of energy in sound.

6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight.

I Can

- I can explain the relationship among visible light, the electromagnetic spectrum, and sight.

6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing.

I Can

- I can explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing.

6.P.2.1 Recognize that all matter is made up of atoms and atoms of the same element are all alike, but are different from

the atoms of other elements.

I Can

- I can recognize that all matter is made up of atoms.
- I can recognize that atoms of the same element are similar, but different from atoms of other elements.

6.P.2.2 Explain the effect of heat on the motion of atoms through a description of what happens to particles during a change in phase.

I Can

- I can explain the effect of heat on the motion of atoms.
- I can describe characteristics of particles in different phases.

6.P.2.3 Compare the physical properties of pure substances that are independent of the amount of matter present including density, melting point, boiling point, and solubility to properties that are dependent on the amount of matter present to include volume, mass and weight.

I Can

- I can compare the physical properties of pure substances that are independent of the amount of matter present (i.e. density, boiling point, melting point, and solubility).

6.P.3.1 Illustrate the transfer of heat energy from warmer objects to cooler ones using examples of conduction, radiation and convection and the effects that may result.

I Can

- I can illustrate the transfer of heat energy from warmer objects to cooler objects using conduction, convection, radiation.

6.P.3.2 Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature.

I Can

- I can explain the effects of electromagnetic waves on various materials.

6.P.3.3 Explain the suitability of materials for use in technological design based on a response to heat (to include conduction, expansion, and contraction) and electrical energy (conductors and insulators).

I Can

- I can explain the suitability of materials for use in technological design based on a response to electrical energy (to

include conductors and insulators).

6.L.1.1 Summarize the basic structures and functions of flowering plants required for survival, reproduction and defense.

I Can

- I can summarize the basic structures and functions of flowering plants required for survival.
- I can summarize the basic structures and functions of flowering plants required for reproduction.
- I can summarize the basic structures and functions of flowering plants required for defense.

6.L.1.2 Explain the significance of the processes of photosynthesis, respiration, and transpiration to the survival of green plants and other organisms.

I Can

- I can explain the processes of photosynthesis in plants.
- I can explain the importance of cellular respiration to the survival of green plants and all other organisms.
- I can explain the significance of the processes of transpiration to the survival of green plants and other organisms.

6.L.2.1 Summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers.

I Can

- I can summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis).
- I can explain that energy is transferred within a food chain or food web (terrestrial and aquatic) from producers to consumers to decomposers.

6.L.2.2 Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment.

I Can

- I can explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment.

6.L.2.3 Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis.

I Can

- I can summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, and tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis.

Resources	Online Reading • Geology4kids, Earth Structure (6.E.2.1, 6.E.2.2) • Lesson 2 Soil (6.E.2.3, 6.E.2.4) • Earth's 4 Layers (6.E.2.1) Labs • Rock Cycle Lab(6.E.2.3) • Ride the Rock Cycle (6.E.2.3) You tube Songs and Parodies: • Alfred Wegener vs. The Fixists (Continental Drift) (6.E.2.2) • The Amoeba People: Continental Drift (6.E.2.2) Bill Nye Videos • Earth's Crust (6.E.2.1) • Earthquakes (6.E.2.2) • Pollution Solution (6.E.2.4) • Volcanoes (6.E.2.2) • Rocks & Soil (6.E.2.3) • Erosion (6.E.2.3) Youtube and other Videos • Nova: Earth From Space (6.E.2.3) • Twig Earth Science Films (6.E.2.2) Study Jams • Earthquakes (6.E.2.2) • Volcanoes (6.E.2.2) • The Rock Cycle (6.E.2.3) • Weathering and Erosion (6.E.2.3) Online Reading • Cosmos 4 Kids, Solar System(6.E.1.2) • Cosmos 4 Kids, Space Exploration (6.E.1.3) • Nine Planets(6.E.1.2, 6.E.1.3)

	• Moon Tides(6.E.1.1) • NASA Eclipse Website(6.E.1.1) Labs • Oreo Lab: Phases of the Moon(6.E.1.1) • NASA Space Place - Spinoffs (6.E.1.3) • Middle School Science with Vernier: What causes Seasons(6.E.1.1) Bill Nye Videos(Schooltube) • Seasons (6.E.1.1) • The Moon (6.E.1.1) • Comets & Meteors(6.E.1.2) • The Planets (6.E.1.2) • The Sun (6.E.1.2) • Space Exploration (6.E.1.3) You Tube channels • The Spangler Effect with Steve Spangler • Sciencefix You Tube and other Videos • TedEd Who Won the Space Race? (6.E.1.3) • Nova: Earth From Space (6.E.1.1, 6.E.1.2, 6.E.1.3) • Neo K12 Eclipse Videos(6.E.1.1) Study Jams • A Day on Earth(6.E.1.1) • Our Solar System: Inner Planets(6.E.1.2) • Our Solar System: Outer Planets(6.E.1.2) • The Moon(6.E.1.1) You Tube science songs and parody songs: • Learningscienceisfun with Mister C • Mr. Parr • You Tube: Mr Parr: Moon • Science with Tom Online Reading • Physics 4 Kids, Heat (6.P.3.1, 6.P.3.3) • Physics 4 Kids, Electricity (6.P.3.3) • Physics 4 Kids, Light (6.P.1.2)

Study Jams
• Energy & Matter(6.P.3.1)
• Light (6.P.1.1, 6.P.3.2)
• Light Absorption, Reflection, Refraction (6.P.3.2)
• The Senses: Seeing (6.P.3.1)
• Heat (6.P.3.1)
• Sound (6.P.1.1, 6.P.1.2)
• The Senses: Hearing (6.P.1.2)

Online Reading
• Chem 4 Kids, Matter (6.P.2.1)
• Chem 4 Kids, Atoms (6.P.2.1)

Lessons
• Middle School Chemistry – Chapter 1 Matter (6.P.2.1)
• Middle School Chemistry – Chapter 2 Changes of State (6.P.2.2)
• Middle School Chemistry – Chapter 3 Density (6.P.2.3)

Study Jams
• Properties of Matter(6.P.2.1)
• Solid, Liquid, Gases(6.P.2.2)
• Physical & Chemical Changes(6.P.2.3)

Online Reading
• Biology4kids, Plants (6.L.1.1)
• Plants (6.L.1.1)
• Plant Processes (6.L.1.2, 6.L.2.2)

Bill Nye (Schooltube)
• Flowers (6.L.1.1)
• Plants (6.L.1.2)

Magic School Bus (Discovery Education)
• Gets Planted (6.L.1.2)
• Goes to Seed (6.L.1.1)

Youtube and other Videos
• TedEd, The Simple Story of Photosynthesis(6.L.1.2)
• NASA, Seeing Photosynthesis from Space(6.L.1.2)
• Photosynthesis(6.L.1.2)

	Study Jams • Photosynthesis(6.L.1.2) • Flowers(6.L.1.1) • Roots & Stems (6.L.1.1) • Plant Parts(6.L.1.1) Online Reading • Interactions of Life (6.L.2.1, 6.L.2.3) Lab • Food Chain Game (6.L.2.1) Bill Nye (Schooltube) • Population (6.L.2.1) Youtube and other Videos • Amoeba Sisters, Food Webs and Energy Pyramids (6.L.2.1) Study Jams: • Ecosystems (6.L.2.3) • Aquatic Ecosystems(6.L.2.3) • Food Chains (6.L.2.1) • Food Webs (6.L.2.1) • Changes in Ecosystems (6.L.2.3) • Biomes(6.L.2.3) Bill Nye • Biodiversity (6.L.2.3) • Food Webs (6.L.2.1) • Populations (6.L.2.1)

NCFE Weight Distribution

Domain	Grade 6
Physical Science 6.P.1 6.P.2 6.P.3	 13-17% 16-22% 7-11%

Earth Science 6.E.1 6.E.2	 9-14% 16-20%
Life S3cience 6.L.1 6.L.2	 2-8% 10-16%

Number of Operational Items by Clarifying Objectives

Grade 6 Science Clarifying Objectives	Number of Operational Items by Objective
Forces and Motion	
6.P.1.1—Compare the properties of waves to the wavelike property of energy in earthquakes, light and sound.	2
6.P.1.2—Explain the relationship among visible light, the electromagnetic spectrum, and sight	2
6.P.1.3—Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing.	2
Matter: Properties and Change	
6.P.2.1—Recognize that all matter is made up of atoms and atoms of the same element are all alike, but are different from the atoms of other elements.	2
6.P.2.2—Explain the effect of heat on the motion of atoms through a description of what happens to particles during a change in phase.	2
6.P.2.3—Compare the physical properties of pure substances that are independent of the amount of matter present including density, melting point, boiling point, and solubility to properties that are dependent on the amount of matter present to include volume, mass and weight.	3

Energy: Conservation and Transfer	
6.P.3.1—Illustrate the transfer of heat energy from warmer objects to cooler ones using examples of conduction, radiation and convection and the effects that may result	1
6.P.3.2—Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature.	1
6.P.3.3—Explain the suitability of materials for use in technological design based on a response to heat (to include conduction, expansion, and contraction) and electrical energy (conductors and insulators).	1
Earth in Universe	
6.E.1.1—Explain how the relative motion and relative position of the sun, Earth and moon affect the seasons, tides, phases of the moon, and eclipses.	2
6.E.1.2—Explain why Earth sustains life while other planets do not based on their properties (including types of surface, atmosphere and gravitational force) and location to the Sun	1
6.E.1.3—Summarize space exploration and the understandings gained from them.	1
Earth Systems, Structures, and Processes	
6.E.2.1—Summarize the structure of the earth, including the layers, the mantle and core based on the relative position, composition and density.	3
6.E.2.2—Explain how crustal plates and ocean basins are formed, move and interact using earthquakes, heat flow and volcanoes to reflect forces within the earth.	2
6.E.2.3—Explain how the formation of soil is related to the parent rock type and the environment in which it develops.	2
6.E.2.4—Conclude that the good health of humans requires:	-

monitoring the lithosphere, maintaining soil quality and stewardship.	
Structures and Functions of Living Organisms	
6.L.1.1—Summarize the basic structures and functions of flowering plants required for survival, reproduction and defense.	2
6.L.1.2—Explain the significance of the processes of photosynthesis, respiration, and transpiration to the survival of green plants and other organisms.	1
Ecosystems	
6.L.2.1—Summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers.	2
6.L.2.2—Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment	1
6.L.2.3—Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis.	2