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UNIT NARRATIVE

This unit will bundle the expectations that assess earth and space science. The unit will begin with space and work into the Earth and the lithosphere and then move to the hydrosphere.

This unit bundles student expectations that address the organization of our solar system, the gravitational relationship among the various bodies that comprise it, and space exploration. Students use scientific practices and a variety of tools to investigate and describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, and comets. They also demonstrate an understanding of the role gravity plays in governing the motion of our solar system and explore the relationship between mass and gravitational attraction.

This unit also includes the student expectations that address the identification of major tectonic plates and geologic events caused by plate movement. Students use scientific practices and a variety of tools to investigate and describe how plate tectonics causes major geologic events. They build on the prior knowledge of convection, the asthenosphere, and the lithosphere to gain an understanding of plate movement

CONTENT STANDARDS

Below are the standards **taught** and **assessed** in this unit.

TEKS in bold are assessed on the 8th grade STAAR.

Readiness Standards
7.9A describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, comets, Kuiper belt, and Oort cloud **7.9B** describe how gravity governs motion within Earth's solar system **7.10A** describe the evidence that supports that Earth has changed over time, including fossil evidence, plate tectonics, and superposition **7.10B** describe how plate tectonics causes ocean basin formation, earthquakes, mountain building, and volcanic eruptions, including supervolcanoes and hot spots. **7.11A** analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed; **7.11B** describe human dependence and influence on ocean systems and explain how human activities impact these systems.
Supporting Standards
7.9C analyze the characteristics of Earth that allow life to exist such as the proximity of the Sun, the presence of water, and the composition of the atmosphere.

UNDERSTANDINGS AND QUESTIONS

Important big ideas and processes for the unit.

Key Understandings
• We live on planet Earth which is the third planet from the Sun in the Solar System planetary system. The Solar System is located on the outer edge of the Milky Way Galaxy. The Milky Way Galaxy is one of many galaxies in the Local Group galaxy cluster. • The Sun is the most massive object in our solar system and overs the motion of all the other objects in the system by the force of gravity. The objects in the Solar System are in motion and maintain that motion because of inertia. If the objects were not in constant motion, the pull of gravity would draw them into the Sun. If there were no gravity the object would continue moving in a straight line into outer space. • Gravity is the force by which a planet or other body draws objects toward its center. Anything with mass has gravity, and objects with more mass have more gravity. • Compared to the outer planets, the inner planters have shorter orbits (orbital circumference and orbital period/revolution) around the Sun. As the distance from the sun (orbital radius) increases, the orbital circumference and the orbital period of the planet increase while the orbital velocity decreases. Orbital circumference = orbital period/orbital revolution = 1 year for the planet • The 8 planets that are in our solar system are classified into 2 main groups, the inner planets, and the outer planets. The four inner planets have shorter orbital periods, greater periods of rotation, and no rings, and they are made of rock and metal. The four outer planets have longer orbital periods, and shorter periods of rotations, a composition of gases and liquids, numerous moons, and rings. The outer planets are made of hydrogen and helium, so they are called gas giants. • The Solar System does not only include the Sun and the planets and their moons, but it also includes minor objects such as asteroids, meteoroids, and comets.

- Earth is unique in the Solar System as being the only planet which can support life in all its forms: from basic living microorganisms to highly sophisticated and intelligent human beings. There are many reasons for this.
- The lithosphere is the solid, outer part of Earth, including the brittle upper portion of the mantle and the crust. Earth's crust is made up of oceanic and continental crust.
  - Oceanic crust is made up of basalt.
  - Continental crust is mostly made of granite.
  - Basalt has a greater density than granite.
- Earth's lithosphere is divided into thick tectonic plates. The major tectonic plates are the African plate, Antarctic plate, Eurasian plate, Indo-Australian plate, North American plate, South American plate, and Pacific plate
- The evidence that supports the movement of the tectonic plates provide scientists with clues about Earth's past and how it is changed over time.
- The arrangement of sedimentary rock layers and the types of fossils found in the layers is a detailed record of events that provide scientists with clues about Earth's past and how it has changed over time.
- The plasticity of the mantle allows convection currents, caused by uneven heating inside the Earth, to move mantle and the asthenosphere. The movement of the mantle allows the tectonic plates to move also.
- Plates move because of convection currents in the mantle. Crustal features (landforms) such as mountain ranges, volcanoes, faults, and ocean basins are formed when tectonic plates interact with another plate. There are three types of plate boundary interactions: divergent, convergent, and transform.
- Human actions can lead to beneficial and harmful effects on groundwater and surface water.
- Humans depend on the oceans for much more than food, from the air we breathe to recreation and medicines the oceans are important to life on Earth.
- Human induced changes in marine ecosystems can have both positive and negative impacts on factors that affect the overall health of the ocean systems.
- Overharvesting food from the ocean creates an imbalance in existing ocean food webs. Other examples of the effects of human activity on oceans include climate change, spread of disease, and introduction of invasive species.

Key Questions

- What is our "universal address?"
- In what ways does gravity govern the motion of our solar system?
- Why does the Sun's gravity not pull the planets into it?
- Why do planets not fly off into outer space?
- In what ways are gravity, mass, and distance related?
- How does the distance from the Sun affect the orbit of the planet?
- What is the relationship between orbital radius, orbital speed, orbital circumference, and orbital period?
- How do the inner planets and outer planets compare?
- What are asteroids, meteoroids, and comets, and where are they found?
- What is the difference is a meteoroid, a meteor, and a meteorite?
- What is special about Earth, that allows life to exist?

- What is the lithosphere?
- What type of rock makes up Earth's crust?
- What are tectonic plates?
- How has the Earth changed over time and how do we know?
- How do the tectonic plates move?
- What happens to the crust when tectonic plates interact with another plate?
- How do human actions impact surface water and groundwater?
- How are humans dependent on the ocean?
- How do human activities impact the ocean?

ROADMAP

Suggested daily guide for instruction in this unit.

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 01: Our Place in Space	**SWBAT** identify our "universal address" and create a model to show the scale of the Solar System **TEKS** 7.9A describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, comets, Kuiper belt, and Oort cloud;	• Students will complete an anticipation guide about what they know about the Milky Way galaxy. • Students will watch a video titled Incredible Zoom: View of Atom to Universe. • Students will then participate in a reading-to-learn activity to determine our "universal address." • Students will then create a large class model to show the scale of distances of the Solar System. • Students will revisit the anticipation guide about the Milky Way galaxy and describe where Earth is located in the universe. <u>Vocabulary</u> Exoplanet Galaxy Galaxy Cluster Planetary System	Lesson 01: Our Place in Space

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 02: Gravity	**SWBAT** explain how gravitational forces and the constant motion of objects govern motion with the Solar System **TEKS** 7.9B describe how gravity governs motion within Earth's solar system	• Students will review the concepts of inertia and gravity and apply their knowledge of these concepts to planets in the thinking task. • Students will model the concepts of inertia and gravity acting upon a planet. • Students will engage in a reading to learn to further their understanding of how inertia and gravity govern the motion of objects in space. • Students will investigate how gravity, mass, and weight are related. • Students will describe how the planets orbit the Sun in an elliptical path and draw a model to support your explanation. <u>Vocabulary</u> Gravity Inertia Orbit Orbital Velocity Revolution	Lesson 02: Gravity
Lesson 03: Planet Locations and Movements	**SWBAT** describe how the orbital radius of a planet affects the orbital circumference, orbital period, and orbital radius of a planet **TEKS** 7.9A describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, comets, Kuiper belt, and Oort cloud;	• Students will make another scale model of the planets in the solar system and identify the inner planets and outer planets. • Students will participate in a modeling activity of the orbital period/revolution on the plants. • Students will analyze data to describe how the orbital radius of a planet affects the orbital circumference, orbital period, and orbital radius of a planet. <u>Vocabulary</u> aphelion orbital circumference orbital period orbital radius perihelion	Lesson 03: Planet Locations and Movements

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 04: Physical Properties of Planets	**SWBAT** classify planets as inner planets or outer planets based on their physical properties **TEKS** 7.9A describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, comets, Kuiper belt, and Oort cloud;	• Students will compare the composition and density of the 8 planets. • Students will use a scale model of the diameter of the 8 planets in our solar system to calculate an estimated actual diameter of the planets. • Students will complete a reading to learn to acquire knowledge about the 8 planets in the Solar System. • Students will complete a graphic organizer to display the physical characteristics of the 8 planets in the Solar System. • Students will complete a Venn Diagram to compare the characteristics of the inner planets and the outer planets. • Students will compare the physical properties of the inner planets and the outer planets. <u>Vocabulary</u> Diameter Radius Rotation Period of Rotation	Lesson 04: Physical Properties of Planets
Lesson 05: Kuiper Belt, Oort Cloud, Asteroids, Meteors, and Comets	**SWBAT** compare and contrast the physical characteristics and locations of asteroids, comets, and meteors. Identify the locations of the Oort cloud and Kuiper Belt. **TEKS** 7.9A describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, comets, Kuiper belt, and Oort cloud;	• Students will watch 2 movie clips where minor space objects (an asteroid and a comet) are going to crash into Earth. Students will discuss what they know about asteroids, comets, and meteoroids. • Students will engage in a Reading to Learn and modeling activity to learn about the physical characteristics and locations of asteroids, comets, and meteoroids in the Solar System. • Students will complete a Venn diagram to compare and contrast the physical characteristics and locations of asteroids, comets, and meteors. <u>Vocabulary</u> Asteroid Asteroid Belt Comet Kuiper Belt Meteor Meteoroid Meteorite Oort Cloud	Lesson 05: Kuiper Belt, Oort Cloud, Asteroids, Meteors, and Comets

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 06: 3rd Rock from the Sun	**SWBAT** describe the characteristics that allow life to exist on Earth. **TEKS** 7.9C analyze the characteristics of Earth that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere.	• Students will review the basic needs of all living organisms. • Students will explore the characteristics of planet or moon that makes it "just right" to support life. • Students will engage in a reading to learn to further their understanding of the characteristics of a planet or moon that are needed to support life. • Students will describe, in writing, the characteristics that a habitable planet must have. <u>Vocabulary</u> Habitable Planet Habitable Zone	Lesson 06: 3rd Rock from the Sun
Lesson 07: The Lithosphere	**SWBAT** review Earth's spheres and describe the lithosphere. **TEKS** 7.10A describe the evidence that supports that Earth has changed over time, including fossil evidence, plate tectonics, and superposition; and	• Students will investigate to compare the density of basalt and granite. • Students will engage in a reading to learn to deepen their understanding of the crust that makes up the Earth's lithosphere. • Students will engage in a modeling activity to explore the major tectonic plate that makes up the lithosphere and describe the type(s) of crust that makeup each of the major tectonic plate. • Students will identify and describe the type of crust that makes up a tectonic plate based on its location on a map. <u>Vocabulary</u> Asthenosphere Continental Crust Extrusive Rock Intrusive Rock Lithosphere Oceanic Crust • Tectonic Plate	Lesson 07: The Lithosphere

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 08: Changing Earth	**SWBAT** describe the evidence scientists use to support the claim that Earth has changed over time. **TEKS** 7.10A describe the evidence that supports that Earth has changed over time, including fossil evidence, plate tectonics, and superposition;	• Students will analyze maps to collect evidence to support the claim that the continents on Earth were once joined together in a supercontinent called Pangea. • Students will then use the evidence to piece the landmasses together to recreate Pangea. • Students will then participate in a reading to learn to learn how the arrangement of sedimentary rock layers and the types of fossils found in the layers provided evidence to how Earth has changed. • Students participate in a card sort where they will sequence the order of events in the formation of a sedimentary rock formation. • Students will describe the evidence scientists use to support the claim that Earth has changed over time. Students will correctly identify the relative age of the layers in a sedimentary rock formation. Students will identify the clues that fossils found in rock formation give about the changes in the environment. <u>Vocabulary</u> Fault Fold Intrusion Law of Superposition Pangea • Unconformity	Lesson 08: Changing Earth
Lesson 09: Movement of Tectonic Plates Part 1	**SWBAT** describe and model the properties of the asthenosphere and mantle that allow for the movement of the tectonic plates. **TEKS** 7.10B describe how plate tectonics causes ocean basin formation, earthquakes, mountain building, and volcanic eruptions, including supervolcanoes and hot spots.	• Students will participate in two activities to explore the properties (plasticity and uneven heating creating convection currents) of the mantle and the asthenosphere that allow for the movement of the tectonic plates. • Students will complete a paragraph to describe the properties of the asthenosphere and mantle that allow for the movement of the tectonic plates. <u>Vocabulary</u> Plasticity Convection Currents	Lesson 09: Movement of Tectonic Plates - Part 1

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 10: Movement of Tectonic Plates Part 2	**SWBAT** describe and model how the movement of tectonic plates cause crustal features and geologic events **TEKS** 7.10B describe how plate tectonics causes ocean basin formation, earthquakes, mountain building, and volcanic eruptions, including supervolcanoes and hot spots.	• Students will locate crustal features on a map using latitude and longitude coordinates and identify patterns that these features occur at plate boundaries. • Students will model the different types of plate interactions. • Students will complete a reading to learn and apply the modeling and map activity to the new concepts they learned. • Students will complete a card short and chart to identify and describe the type of plate boundary, the type of plates that are interacting, the crustal features that are formed, and an example of each. <u>Vocabulary</u> Convergent Boundary Divergent Boundary Subduction Transform Boundary	Lesson 10: Movement of Tectonic Plates Part 2
Lesson 11: The Hydrosphere Part 1	**SWBAT** Analyze the effects of human activity on groundwater and surface water in a watershed **TEKS** 7.11A analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed;	• Students will brainstorm actions that people can take to keep our groundwater safe and actions that people do which cause harm to or contaminate our groundwater. • Students will create 4 models to show different ways human impact surface water and ground water. • Students will engage in a reading to learn to deepen their understanding of surface water, ground water and how human actions impact these water systems. • Students will identify the major watersheds in Texas and analyze the effects of human actions on these watersheds. • Students will analyze scenarios and describe the impact that the situation described in the scenario will have on the groundwater and surface water. <u>Vocabulary</u> Aquifer Groundwater Surface water	Lesson 11: The Hydrosphere Part 1

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 12: The Hydrosphere Part 2	**SWBAT** describe how human are dependent on ocean systems and describe human actions impact the ocean. **TEKS** 7.11B describe human dependence and influence on ocean systems and explain how human activities impact these systems.	• Students will conduct a card short to determine how humans are dependent on the oceans. • Students will conduct a modeling activity to simulate overfishing in the ocean. • Students will watch 2 videos to deepen their understanding of how humans are dependent on ocean systems and the impacts humans have on the ocean. • Students will describe how human are dependent on ocean systems and describe human actions impact the ocean.	Lesson 12: The Hydrosphere Part 2
Unit 03 Exam			

UNPACKED STANDARDS

Focus standards for this unit.

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**

7.9A describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, comets, Kuiper belt, and Oort cloud;	Cognition: Describe
	Content: Physical properties, locations, and movements
	<u>Including, but not limited to:</u>
	• Physical properties of objects
	  ○ Temperature
	  ○ Comparative size/mass
	  ○ Composition
	  ○ Terrestrials vs. gas giants
	  ○ Atmosphere
	• Location of objects
	  ○ Relative distance from the Sun
	• Movement of objects
	  ○ Orbits
	  ○ Rotation
	  ○ Revolution
	• Objects in the solar system
	  ○ Sun
	  ○ Planets
	  ○ Moons
	  ○ Asteroids
	  ○ Meteors
	  ○ Comets
	  ○ Kuiper belt
	  ○ Oort cloud
		STAAR:
		• Although not identified as a Supporting Standard, this student expectation builds the foundation for the content of Readiness Standard 8.8A.
		• According to 2017 STAAR, #16, any object in the solar system listed within student expectation 6.11A which is now 7.9A may be assessed under 8.8A, "Describe components of the universe…"

7.9B describe how gravity governs motion within Earth's solar system; and	Cognition: describe Content: gravity governs motions with Earth's solar system <u>Including, but not limited to:</u> • Gravity – force of attraction between two objects due to their masses	**STAAR:** • Grade 8 students may be assessed on STAAR regarding their understanding of the gravitational relationships of objects in our solar system and their motion. This concept is not revisited before the STAAR test in Grade 8.

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**
	○ Larger masses have a larger gravitational force than smaller masses • Recognize gravitational attraction (force) between ○ Sun and Moon ○ Sun and planets ▪ Planets travel in a curved path (ellipse) instead of a straight line ○ Planets and their moon(s) ○ Sun and other objects in our solar system • Motion of our solar system ○ Revolution ○ Orbit	• Students may be assessed on the unbalanced force of gravity in the context of Earth's motion.
7.9C analyze the characteristics of Earth that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere.	Cognition: Analyze Content: characteristics of Earth that allow life to exist <u>Including, but not limited to:</u> • Proximity to the Sun • Presence of water • Composition of the atmosphere	
7.10A describe the evidence that supports that Earth has changed over time, including fossil evidence, plate tectonics, and superposition; and	Cognition: Describe Content: evidence that supports that Earth has changed over time <u>Including, but not limited to:</u> • Fossil evidence ○ Fossil record in sedimentary rock • Plate tectonics ○ Plates of the lithosphere are constantly moving ○ Pangea • Superposition • Law of superpositon- states that layers of rock are superimposed, or laid down one on top of another. The oldest rock strata will	

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**
	be on the bottom and the youngest at the top	

7.10B describe how plate tectonics causes ocean basin formation, earthquakes, mountain building, and volcanic eruptions, including supervolcanoes and hot spots.	Cognition: describe
	Content: how plate tectonics causes (geologic events)
	<u>Including, but not limited to:</u>
	• Causes of plate movement
	  ○ Convection currents
	  ○ Earth's mantle
	• Types of plates
	  ○ Oceanic crust (thinner, more dense)
	  ○ Continental crust (thicker, less dense)
	• Types of plate motions
	  ○ Divergent- two plates moving apart
	  ○ Convergent- two plates coming together
	  ○ Transform- two plates sliding past each other in opposite directions
	• Geological events
	  ○ Divergent
	  ▪ Seafloor spreading leading to the formation of ocean basins and mid-ocean ridges
	  ▪ Volcanic eruptions
	  ▪ Earthquakes
	  o Convergent
	  ▪ Mountain building
	  ▪ Volcanic eruptions
	  ▪ Earthquakes
	  ○ Transform
	  ▪ Earthquakes	

7.11A analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed; and	Cognition: Analyze Content: the beneficial and harmful influences of human activity on groundwater and surface water in a watershed	STAAR: • The effects of human activity on groundwater and surface water in a watershed is explicitly

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**

	Including, but not limited to:
	• Watershed – an area of land where all of the groundwater and surface water from the area drains from higher areas to lower areas and into the same body of water
	  ○ Groundwater (underground)
	  ▪ Recharge zones
	  ▪ Aquifers
	  ▪ Springs
	  ▪ Wells
	  ▪ Water table
	  ○ Surface water (above ground)
	  ▪ Rivers
	  ▪ Streams
	  ▪ Ponds
	  ▪ Lakes
	  ▪ Gulfs
	  ▪ Wetlands
	  ▪ Estuaries
	  ▪ Swamps
	• Effects of human activity
	  ○ Water pollution
	  ▪ Surface water
	  ▪ Groundwater
	  ○ Possible examples of effects may include:
	  ▪ Surface runoff polluting lakes, rivers, streams, and aquifers
	• Water use and conservation
		taught in Grade 7. This concept is not revisited before the STAAR test in Grade 8.

7.11B describe human dependence and influence on ocean systems and explain how human activities impact these systems.	Cognition: Describe Content: describe human dependence and influence on ocean systems Including, but not limited to • Water • Food • Oxygen	STAAR: • This is the first time students have been introduced to human dependence on ocean systems.

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**

	Cognition: Explain
	Content: human activities
	Including, but not limited to
	• Runoff (pollution of ocean waters, reduction in food supply)
	• Artificial reefs (increase in habitat / food supply)
	• Use of resources (depletion of organisms from the ocean)
	• Possible additional examples of human activities:
	  ○ Overfishing
	  ○ Introduction of invasive species	

VERTICAL STANDARDS

This section details the **progression** of key student expectations/standards** in the courses **before** and **after** this course. This will help you understand what **prior knowledge skills to build upon** and guide you in knowing what **skills you are preparing your students** for in the subsequent course.

6th Grade	7th Grade	Course/Grade
6.9A model and illustrate how the tilted Earth revolves around the Sun, causing changes in seasons 6.9B describe and predict how the positions of the Earth, Sun, and Moon cause daily, spring, and neap cycles of ocean tides due to gravitational forces. 6.7A identify and explain how forces act on objects, including gravity, ~~friction, magnetism, applied forces, and normal forces, using real-world applications;~~	7.9A describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, comets, Kuiper belt, and Oort cloud;	
	7.9B describe how gravity governs motion within Earth's solar system; and	
	7.9C analyze the characteristics of Earth that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere.	

6.10A differentiate between the biosphere, hydrosphere, atmosphere, and geosphere and identify components of each system; 6.10B model and describe the layers of Earth, including the inner core, outer core, mantle, and crust 6.10C describe how metamorphic, igneous, and sedimentary rocks form and change through geologic processes in the rock cycle.	7.10A describe the evidence that supports that Earth has changed over time, including fossil evidence, plate tectonics, and superposition; and	
	7.10B describe how plate tectonics causes ocean basin formation, earthquakes, mountain building, and volcanic eruptions, including supervolcanoes and hot spots	
6.11A research and describe why resource management is important in reducing global energy, poverty, malnutrition, and air and water pollution 6.11B explain how conservation, increased efficiency, and technology can help manage air, water, soil, and energy resources.	7.11A analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed; and	
	7.11B describe human dependence and influence on ocean systems and explain how human activities impact these systems.	

VOCABULARY GLOSSARY

Domain-specific words and definitions for this unit.

Key Content Vocabulary
• **Asthenosphere** - lies beneath the lithosphere and consists of several hundred miles of partially molten rock. • **Asteroid** – a small, rocky body that orbits the Sun. • **Asteroid Belt** - the region in space between the orbits of Mars and Jupiter, containing the greatest population of asteroids in our solar system. • **Aphelion** - the point at which a planet is the furthest from the Sun in its orbit. • **Aquifer** - An underground layer of permeable rock, sediment (usually sand or gravel), or soil that stores water. • **Comet** – an object that orbits the Sun; made of frozen water and dust, and has a tail of gas and dust particles that points away from the Sun. • **Continental Crust-** the part of the lithosphere made up of igneous granite rock found under the continents. • **Convection Currents -** transfer of thermal energy from one place to another by mass motion of a fluid such as water, air, or molten rock. • **Convergent Boundary** – a tectonic boundary where two plates are moving toward each other. • **Diameter -** any straight-line segment that passes through the center of the circle and whose endpoints lie on the perimeter of the circle. • **Divergent Boundary** - a tectonic boundary where two plates are moving away from each other.

- **Exoplanets -** planets that orbit other stars, not the Sun.
- **Extrusive Rock –** igneous rock that forms from lava that hardened on the surface of the Earth.
- **Fault -** a large diagonal crack running through a rock.
- **Fold –** the bending of rock due to stresses such as compression, tension, or shearing.
- **Galaxy** - a huge collection of gas, dust, and billions of stars and their star systems, all held together by gravity.
- **Galaxy cluster -** a structure that consists of anywhere from hundreds to thousands of galaxies that are bound together by gravity.
- **Gravity** – force of attraction between two objects due to their masses.
- **Groundwater** - water held underground in the soil or in pores and crevices in rock.
- **Habitable Planet** - one that can sustain life for a significant period of time**.**
- **Habitable Zone** - the distance from a star at which liquid water could exist on orbiting planets' surfaces.
- **Inertia** - the tendency of an object to resist a change in its state of motion until some force causes its speed or direction to change.
- **Intrusion –** the forcing of molten rock into cracks, faults, or between layers of rock formations.
- **Intrusive Rock** – igneous rock that forms from magma that hardens beneath the surface of the Earth.
- **Kuiper Belt** - a region of the solar system beyond the orbit of Neptune, believed to contain many comets, asteroids, and other small bodies made largely of ice.
- **Law of Superposition -** states that each rock layer or strata is older than the one above it.
- **Lithosphere -** the rigid outer part of the earth, consisting of the crust and upper mantle.
- **Meteor** – a small piece of matter from outer space that becomes a streak of light when it falls through the Earth's atmosphere and burns up; also known as a falling or shooting star.
- **Meteoroid** - a small body moving in the solar system outside the Earth's atmosphere.
- **Meteorite** - a meteor that survives its passage through the Earth's atmosphere and strikes the ground.
- **Oceanic Crust –** the part of the lithosphere made up of igneous basalt rock found under the oceans.
- **Oort Cloud** - a hypothetical region of our solar system far beyond the orbit of Pluto, in which billions of comets move in nearly circular orbits.
- **Orbit** – the path that one object in space follows as it revolves around another object in space.
- **Orbital Circumference -** the total distance traveled by the object during one complete period.
- **Orbital Period** (also known as the **revolution period**) - the amount of time a given astronomical object takes to complete one orbit around another object.
- **Orbital Radius -** the average distance of an object from the object it is orbiting around.
- **Orbital Velocity** - the speed at which a celestial body revolves around the orbit of another celestial body.
- **Pangea -** a supercontinent that existed during the late Paleozoic and early Mesozoic eras.
- **Perihelion** - the point at which a planet is nearest the Sun in its elliptical orbit.
- **Planetary System** – a group of planets, meteors, or other objects that orbit a large star.
- **Plasticity -** the ability to flow or to change shape when subjected to stress.
- **Radius** - is any of the line segments from its center to its perimeter.
- **Revolution** – one complete orbit made by a planet or satellite around another object.
- **Rotation -** the spinning or turning of a planet on its axis.
- **Period of Rotation** - the time it takes a planet to complete one spin.

- **Subduction** - the sideways and downward movement of the edge of a plate of the earth's crust into the mantle beneath another plate.
- **Surface water** - water that collects on the surface of the ground.
- **Tectonic Plate** - pieces of the Earth's crust and uppermost mantle that together make up the lithosphere.
- **Transform Boundary -** a tectonic boundary where two plates slide past each other.
- **Unconformity-** a missing piece of rock layer due to erosion.**Transform Boundary -** a tectonic boundary where two plates slide past each other.
- **Unconformity-** a missing piece of rock layer due to erosion.

Consumable Materials and Lab Supplies for Unit 1 (1 per group of 4 students unless noted)

Lesson	Commercial Vendor	Lab Supplies (Science Vendor)
Lesson 01: Our Place in Space	• One roll of toilet paper. • Felt-tip marker(s) or gel pen, preferably 10 colors; but one pen per group will do. • Clear tape for repairs • Books or other objects to hold toilet paper down if you choose a location outside to complete the model.	
Lesson 02: Gravity	<u>Marbles in Motion (per group)</u> • Transparent plastic cup • Marble • Markers or map pencils <u>What's the Motion- teacher demo</u> • 1 foam ball • 1 plastic tube (an empty pen tube will work) • 50 cm of string or yarn • 1 large paperclip • 5-10 metal washers (depending on the size) <u>A Weight Matter (per group)</u> 2-liter bottle String Water	<u>What's the Motion- teacher demo</u> • Safety Goggles <u>A Weight Matter (per group)</u> Spring scale Triple beam balance Graduated cylinder
Lesson 03: Planets Locations and Movements	<u>Distance Between the Sun and the Planets</u> • Prior to class, set up the classroom model <u>Pocket Solar System (per student)</u>	<u>Distance Between the Sun and the Planets</u> • metric ruler • calculator <u>Pocket Solar System (per student)</u> • Scissors

	• 1-meter piece of receipt paper, or a long strip of paper at least 3 inches wide (card stock or sentence strips work well) • Pocket Solar System Planet and Object images (optional) or dot sticker (optional) or markers/colored pencils <u>Orbital Period (revolution) of Planets</u> • Lengths of yarn wrapped around popsicle sticks: 1m, 1.5m, 5m, 10m.	• Pencil • Tape or glue <u>Orbital Period (revolution) of Planets</u> • Colored pencils • Stopwatch
Lesson 04: Physical Properties of Planets		• Calculator • Ruler
Lesson 05: Kuiper Belt, Oort Cloud, Asteroids, Meteors, and Comets	None	None
Lesson 06: Third Rock from the Sun	blank folder 1 Die 1 gallon sized resealable bag 3-4 game pieces (pawn style or beans or erasers can also be used)	
Lesson 07: The Lithosphere	<u>Name that Plate (per student)</u> • Glue • Construction paper	<u>Don't Take it for Granite!</u> • Sample of granite and basalt (found in igneous rock sample • Hand lens • 100 mL graduated cylinder • Balance • Water <u>Name that Plate (Per student)</u> • Scissors Markers or colored pencil
Lesson 08: Changing Earth	<u>Evidence of a Changing Earth</u> • Construction paper • Glue	<u>Evidence of a Changing Earth</u> • Map pencils • Scissors
Lesson 09: Movement of Tectonic Plates Part 1	<u>Plasticity Lab</u> • Cornstarch • Water • Craft stick • Paper towels • Small paper cup	<u>Plasticity Lab</u> • Balance • Pipette • 50 mL beaker <u>Thermal Energy Transfer</u> • Hot plate

	Thermal Energy Transfer • Wax paper • Clear plastic pan (dollar store – potted plant tray will work) • Water • Paper towels • 4 foam cups • Cold water (ice) • Food coloring	• Pipette • 500 mL beaker • Heat resistant gloves
Lesson 10: Movement of Tectonic Plates Part 2	Thinking Task (per student) • Sheet Protector • dry erase marker Modeling Tectonic Plate Interactions • Wax paper • ½ 16 oz. tub of frosting • Plastic knife • 1 red Fruit Roll-Ups© snack • 1 whole graham cracker • Cup with water	
Lesson 11: The Hydrosphere Part 1	Station 1 • Clear plastic container (3 x 5 x 7) • Balloon • Food coloring • Pushpin • Foam cup • Pebbles • Pump from hand soap dispenser • Plastic cup • Strainer or sieve Station 2 • Clear plastic container (3 x 5 x 7) • Powdered drink mix • Foam cup • Pebbles • Plastic cup • Strainer or sieve • Plastic wrap • Large sponge Station 3	Station 1 • Water • Paper towels • 50 ml graduated cylinder Station 2 • Water • Paper towels • 50 ml graduated cylinder Station 3 • Water • Paper towels • 50 ml graduated cylinder Station 4 • Water • Paper towels

	• Clear plastic container (3 x 5 x 7) • Plastic toy cow • Foam cup • Pump from hand soap dispenser • Yellow food coloring • Plastic cup • Strainer or sieve <u>Station 4</u> • Large sheet of white chart paper or butcher paper • Water-soluble markers Spray bottle	
Lesson 12: The Hydrosphere Part 2	<u>Go Fish (per group)</u> • 4 straws • 4 pieces of string • 1 paper plate • 4 napkins • 1 roll of tape • 1 cup or beaker <u>Per Teacher</u> • Box of resealable bags • 1 large box of multicolored goldfish crackers (4 colors)	<u>Go Fish (per group)</u> • 1 roll of tape • 1 cup or beaker