6th Grade Science
Overview
2022 – 2023

This document is designed to provide parents/guardians/community an overview of the curriculum taught in the FBISD classroom. This document supports families in understanding the learning goals for the course, and how students will demonstrate what they know and are able to do. The overview offers suggestions or possibilities to reinforce learning at home.

Included at the end of this document, you will find:

- A glossary of curriculum components
- The content area instructional model
- Parent resources for this content area

To advance to a particular grading period, click on a link below.

Process Standards

The process standards describe ways in which students are expected to engage in the content. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use knowledge learned efficiently and effectively in daily life.

6.1(A) demonstrate safe practices during laboratory and field investigations as outlined in Texas Education Agency-approved safety standards.
6.1(B) practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials.
6.2(A) plan and implement comparative and descriptive investigations by making observations, asking well-defined questions, and using appropriate equipment and technology.
6.2(B) design and implement experimental investigations by making observations, asking well defined questions, formulating testable hypotheses, and using appropriate equipment and technology.
6.2(C) collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers.
6.2(D) construct tables and graphs, using repeated trials and means, to organize data and identify patterns.
6.2(E) analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.
6.3(A) analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.
6.3(B) use models to represent aspects of the natural world such as a model of Earth's layers.
6.3(C) identify advantages and limitations of models such as size, scale, properties, and materials.
6.3(D) relate the impact of research on scientific thought and society, including the history of science and contributions of scientists as related to the content.
6.4(A) use appropriate tools, including journals/notebooks, beakers, Petri dishes, meter sticks, graduated cylinders, hot plates, test tubes, balances, microscopes, thermometers, calculators, computers, timing devices, and other necessary equipment to collect, record, and analyze information.

6.4(B) use preventative safety equipment, including chemical splash goggles, aprons, and gloves, and be prepared to use emergency safety equipment, including an eye/face wash, a fire blanket, and a fire extinguisher.

Grading Period 1

Unit 1: Scientific Processes and Measurement

Estimated Date Range: August 10 – September 12
Estimated Time Frame: 23 Days

Unit Overview:
In this unit, students will review safety rules for laboratory investigations and learn information on how scientists identify and solve problems. Students will design scientific investigations that include science practices. Students will make observations, ask well defined questions, formulate testable hypotheses, plan, and carry out experiments, and collect, record, and organize data. Students will also analyze, evaluate, make inferences, and predict trends from data. Students should be given opportunities to communicate the results, analysis, and conclusions from hands-on activities, laboratory investigations and other types of inquiry-based activities. This unit is important because students need to experience the processes of experimental design, which allows them to write scientific explanations.

At home connections:

- Have a conversation with students about safety practices and rules/procedures that are used at home.
- One important part of designing an experiment is planning the experiment and procedures. Students can practice designing the procedures for an activity that is interesting to them. For example, it could be related to music, sports, or a hobby. The procedures should be specific so that someone else can follow them. Students should think about how data will be collected and the safety issues that need to be addressed. An adult can read the procedures and try to follow them exactly as written to help the student determine if adjustments need to be made.

Concepts within Unit #1 Link to TEA Middle School Science TEKS	Success Criteria for this concept
Concept #1: Safety 6.1A, 6.1B, 6.4B	• Locate and describe the use of safety equipment. • Follow all the safety rules during laboratory/field investigations. • Use laboratory equipment in an appropriate manner.
Concept #2: Scientific Processes 6.2B, 6.2C, 6.2D, 6.2E	• Design and conduct a lab investigation using the following science practices- ○ develop a scientific question (problem) ○ formulate a testable hypothesis ○ Procedures ○ collect, organize, and analyze data ○ draw conclusion based on the data

Unit 2: Organisms and Environment

Estimated Date Range: September 13– October 7
Estimated Time Frame: 18 days

Unit Overview:
In this unit, students will learn that ecosystems consist of biotic and abiotic factors. They will understand that the ecosystem is divided into levels of organization where organisms that can be classified into Kingdoms based upon their basic characteristics. Living things are further divided into three groups (domains) based on their genetic similarity such as cell type (prokaryote or eukaryote), ability to make food (autotroph or heterotroph) and the number of cells they contain (multicellular or unicellular). The three domains are Bacteria, Archaea, and Eukarya. Students will cellular structures by viewing various cells under a microscope to see the components. It is important for students to understand how scientists classify organisms based on

shared characteristics (i.e., cellular and structural characteristics) and the ways organisms interact with their environment in the real world.

At home connections:

- Adults can give students several items to classify. Students can group items together based on common characteristics. Ask students to explain the characteristics they used to describe the items in each group.
- Students can research information about an organism (house pet. Plant, aquatic animal, etc.) then determine the environmental levels of organization (organism, population, community, and ecosystem). Students can create a drawing to represent the levels of organization for that organism. Students can create a story about the organism living within the various levels. Also, state how the organism interacts with abiotic and biotic factors.

Concepts within Unit # 2 **Link to TEA Middle School Science TEKS**	**Success Criteria for this concept**
Concept #1: Organisms 6.2E, 6.3A, 6.3C, 6.4A, 6.12A, 6.12B, 6.12C, 6.12D	• Determine if organisms are unicellular or multicellular using a microscope. • Use illustrations and prepared slides, to determine whether an organism is prokaryotic or eukaryotic based on the cell structure • Classify organisms into their domains (Archaea, Bacteria or Eukarya) based on cell type and living environment. • Classify organisms into the 6 kingdoms (Archaebacteria, Eubacteria, Protist, Fungi, Plant, and Animal) based on the following characteristics: ○ Cell type (Prokaryotic or eukaryotic) ○ Number of cells (Unicellular or Multicellular) ○ Method to obtain energy (Autotrophic or heterotrophic) ○ Mode of reproduction (sexual or asexual)
Concept #2: Environment 6.2C, 6.12E, 6.12F	• Explain the parts of an ecosystem. • Identify and describe the levels of organization within an ecosystem including organism, population, community, and ecosystem. • Explain how biotic factors depend on abiotic factors in an ecosystem. • Describe how abiotic and biotic factors interact within the ecosystem, such as competition for food, space, and water.

Grading Period 2

Unit 3: Chemistry

Estimated Date Range: October 12 – November 15
Estimated Time Frame: 25 Days

Unit Overview:
In this unit, students will be able to identify and describe the three classes of elements to learn more detail about how the periodic table is organized when they reach 8th grade. Students will gain a deep understanding of this topic and be able to identify unknown substances based on their physical properties. The students will also understand the fundamental differences between elements and compounds. Sixth graders are expected to compare the luster, conductivity and malleability of metals, nonmetals, and metalloids. Students are expected to calculate density to identify an unknown substance. Students should understand the concept of density as it applies to authentic situations.

At home connections:

- With adult supervision, students can determine the density of objects by seeing if they will sink or float in water. This can be done in a sink or large bowl containing water. Students should not use sharp or dangerous objects and need to be mindful of the safety rules.

Concepts within Unit # 3 **Link to TEA Middle School Science TEKS**	**Success Criteria for this concept**
Concept #1 Elements and Compounds 6.2C, 6.2E, 6.3A, 6.3B, 6.4A, 6.4B, 6.5A, 6.5B, 6.5C	• Differentiate between an element and a compound • Compare chemical symbols and formulas of substances to differentiate between elements and compounds. • Using the periodic table, I will identify the most abundant elements that are found in the Earth's living matter, oceans, and atmospheres • Identify and describe the evidence that proves that a possible chemical change occurred, and a new substance was formed, through a lab investigation: ○ Production of gas ○ Change in temperature ○ Production of a precipitate ○ Color change
Concept #2 Metals and Non-metals 6.2A, 6.2C,6.2D, 6.2E, 6.3A, 6.4A, 6.6A	• Identify what physical properties are associated with metals, nonmetals, and metalloids. • Test elements for conductivity, malleability, ductility, and luster • Classify it as a metal, nonmetal, or metalloid, when given an element's physical properties.
Concept #3: Density 6.2A, 6.2C, 6.2E, 6.3A, 6.4A, 6.6B	• Use the appropriate tools to find the mass and volume of a substance including regular and irregular shaped objects • Calculate density of different types of matter • Determine the identity of an unknown substance by calculating its density and comparing it to given data (density table)

Unit 4: Energy

Estimated Date Range: November 16 – December 16
Estimated Time Frame: 18 days

Unit Overview:
In this unit, students will be able to recognize and demonstrate energy transformations, investigate methods of thermal energy, and verify through investigations that thermal energy moves in predictable pattern. In fifth grade, students explored the uses of energy, including mechanical, light thermal, electrical, and sound energy; this should assist them as they are expected to understand all forms of energy. Sixth grade students are also expected to research and discuss the advantages and disadvantages

of using coal, oil, natural gas, nuclear power, biomass, wind, hydropower, geothermal, and solar resources. There are several real-world examples that students can discover about energy and energy transformations.

At home connections:

- Ask the student to brainstorm examples of each form of energy that can be found at school or at home. The forms of energy are chemical, sound, electrical, thermal, mechanical, nuclear, and radiant.
- Students can create images that will help them remember and explain the meanings of each type of thermal energy (conduction, convection, and radiation). After creating the images, students can identify, label, and explain objects that act as insulators and conductors.

Concepts within Unit # 4 **Link to TEA Middle School Science TEKS**	**Success Criteria for this concept**

Concept #1: Energy Transformations
6.2B, 6.2E, 6.3A, 6.7, 6.9C
	• Recognize the different forms of energy:
	  ○ Chemical
	  ○ Sound
	  ○ Electrical
	  ○ Thermal
	  ○ Mechanical
	  ○ Nuclear
	  ○ Radiant
	• Explain how one form of energy transforms into another form of energy.
	• Identify and describe the different energy resources including advantages and disadvantages:
	  ○ Fossil fuels
	  ▪ Coal
	  ▪ Oil
	  ▪ Natural gas
	  ○ Nuclear power
	  ○ Biomass
	  ○ Wind
	  ○ Hydropower
	  ○ Geothermal
	  ○ Solar

Concept #2: Thermal Energy
6.2E, 6.3A, 6.4A, 6.9A, 6.9B
	• Explain thermal energy
	• Investigate and describe how thermal energy is transferred through:
	  ○ conduction
	  ○ convection
	  ○ radiation
	• Using a scientific investigation, measure, and record temperature to describe the movement of thermal energy
	• Determine how thermal energy moves in a predictable pattern.

Grading Period 3

Unit 5: Force and Motion

Estimated Date Range: January 5 – February 10
Estimated Time Frame: 26 days

Unit Overview:
In this unit, students will learn that all matter contains energy and energy can cause change. An object not moving contains stored energy (potential energy), and when an unbalanced force is applied to an object, it can cause the object to move (kinetic energy). Some of the forms of energy may be converted into heat energy due to friction. As the learning continues, it will become clear to students that they will be able to identify and describe the changes in position, direction of motion, and the speed of an object when acted upon by an outside force. Laboratory experiences will assist students as they demonstrate that changes in motion can be measured and graphed. Students will calculate average speed using distance and time measurement. Students will identify simple machines and investigate how inclined planes can be used to change the amount of force to move an object. Students will be able to explain how simple machines make work (a force acting on an object in the direction of motion) easier to perform. It is important for students to experience how force and motion applies to everyday life by making connections to real world examples.

At home connections:

- Adults can have a conversation with students about the kinetic and potential energy. Students should be able to identify where kinetic and potential energy is occurring within a scenario such as when a ball is kicked, a rollercoaster is going on a track, or when a skateboarder is skating up and down a ramp.
- Students can give everyday examples of unbalanced forces that cause an object motion to change. Examples can be related to school or home. Ask students to explain how the unbalanced force caused a change in the speed, position, or direction.

Concepts within Unit # 5 Link to TEA Middle School Science TEKS	**Success Criteria for this concept**
Concept #1: Force and Motion 6.2C, 6.2E, 6.3A, 6.2D, 6.4A, 6.8A, 6.8B, 6.8C, 6.8D, 6.8E	• Explain the two types of energy, potential and kinetic energy • Compare and contrast the potential and kinetic energy of an object in different positions and speeds • Describe force, motion, balanced forces, and unbalanced forces • Describe what happens to an object's position, speed, and direction when a balanced or unbalanced force is applied • Explain how unbalanced forces cause changes in motion using everyday examples • Calculate average speed by using the formula speed = distance/time • Create tables, charts, and graphs to show the motion of a moving object relative to speed vs. time and distance vs. time • Identify the different types of inclined planes • Describe how an inclined plane effects the amount of force needed to move an object • Compare the amount of force needed to move an object with and without an inclined plane

Unit 6: Geology

Estimated Date Range: February 13 – March 10
Estimated Time Frame: 18 days

Unit Overview:
In this unit, students create a model to explain the layers of the earth. Although the students have some background knowledge of how sedimentary rocks are formed, they will study the rock cycle in its entirety for the first time. Students will classify rocks as metamorphic, igneous, or sedimentary by the processes of their formation. The students will describe how plate tectonics cause major geological events such as ocean basins, earthquakes, volcanic eruptions, and mountain building. In addition, students will use manipulatives to demonstrate how the major plates fit together. This Geology unit is important because students will learn about how different geological events and processes occur.

At home connections:

- Adults can show students different types of rocks and minerals archived at the Smithsonian National Museum of Natural History's website using the following links: Rock Gallery Minerals Gallery
- Students can research a career in geology such as a geologist, geophysicist, surveying and mapping technicians, petroleum technician, just to name a few. Students can gather information about four categories:
  - What you will do:
  - Where you might work:
  - Education:
  - Other job requirements:

Concepts within Unit # 6 **Link to TEA Middle School Science TEKS**	**Success Criteria for this concept**

Concept #1: Minerals and the Rock Cycle	• Classify the rock based on how it was formed:
	  ○ Metamorphic
	  ○ Igneous
	  ○ Sedimentary
	• Explain how metamorphic, igneous, and sedimentary rocks are formed
	• Summarize three ways that minerals form
	• Identify all the physical properties of an unknown mineral

Concept #2: Earth's Surface	• List and identify the physical layers of the Earth (lithosphere, asthenosphere, mesosphere) • Describe the layers of the Earth in terms of composition, state of matter, density, and thickness. • Build a model to illustrate the structural layers of Earth and discuss the model's limitations

Grading Period 4

Unit 6: Geology (continued)

Estimated Date Range: March 20 – April 17
Estimated Time Frame: 19 days

Unit Overview:
In this unit, students create a model to explain the layers of the earth. Although the students have some background knowledge of how sedimentary rocks are formed, they will study the rock cycle in its entirety for the first time. Students will classify rocks as metamorphic, igneous, or sedimentary by the processes of their formation. The students will describe how plate tectonics cause major geological events such as ocean basins, earthquakes, volcanic eruptions, and mountain building. In addition, students will use manipulatives to demonstrate how the major plates fit together. This Geology unit is important because students will learn about how different geological events and processes occur.

At home connections:

- To help reinforce what students learned in class about the cause-and-effect relationship between plate boundary movement and their resulting geologic event, have students use the Mountain Maker, Earth Shaker interactive. Students can use the interactive to explore four types of plate tectonic activity.

Concepts within Unit # 6 Link to TEA Middle School Science TEKS	Success Criteria for this concept

Concept #3: Plate Tectonics
6.2E, 6.3A, 6.3B,6.10D
	• Describe and explain the cause-and-effect relationship between plate boundary movements and their resulting geologic events:
	  ○ ocean basins
	  ○ earthquakes
	  ○ volcanic eruptions
	  ○ mountain building
	• Identify and locate the major tectonic plates of the Earth.
	• Describe how convection currents cause the tectonic plates to move.
	• Describe and give examples of plate tectonics.
	• Investigate and describe the different ways that the tectonic plates move.
	  ○ Divergent
	  ○ Convergent
	  ○ Transform

Unit 7: Space

Estimated Date Range: April 18 – May 25
Estimated Time Frame: 28 days

Unit Overview:
In this unit, students will describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, and comets. The students will understand that gravity is the force that governs the motion of our solar system, and describe the history and future of space exploration, including the types of equipment and transportation needed for space travel.

At home connections:

- Adults can view the various Tools of Exploration with students to create a timeline of past space travel.

Concepts within Unit # 6 Link to TEA Middle School Science TEKS	Success Criteria for this concept

Concept #1: Space
6.2E, 6.3A, 6.3B, 6.3C, 6.3D, 6.11A, 6.11B, 6.11C
	• Identify all components that make up the solar system.
	  ○ Sun
	  ○ Moon
	  ○ Asteroids
	  ○ Comets
	  ○ Meteorites
	  ○ Planets
	• Differentiate between sun, Galilean moon, planets, asteroids, and comets
	• Explain where each component of the solar system is located, how it moves and give physical characteristics of each
	• Describe how gravity effects the motion of the solar system
	• Create a timeline of past space travel including types of equipment and vehicles used
	• Explain what space travel will be like in the future

Glossary of Curriculum Components

Overview– The content in this document provides an overview of the pacing and concepts covered in a subject for the year.

TEKS – Texas Essential Knowledge and Skills (TEKS) are the state standards for what students should know and be able to do.

Unit Overview – The unit overview provides a brief description of the concepts covered in each unit.

Concept – A subtopic of the main topic of the unit.

Success Criteria—a description of what it looks like to be successful in this concept.

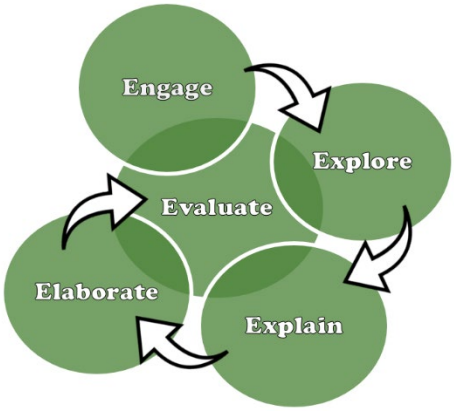
Parent Resources

The following resources provide parents with ideas to support students' understanding. For sites that are password protected, your child will receive login information through their campus.

Resource	How it supports parents and students
6th Grade Science Fusion	This is the state adopted textbook for grade 6 science. Click on the link for directions on accessing the textbook.
Khan Academy	This resource contains practice exercises, instructional videos, and a personalized learning dashboard where students can learn and study at their own pace.
Texas Gateways	This online resource contains lessons, videos, and interactive activities for various science concepts.
NSTA – Science Resources for Parents	This online resource has science activities for middle school students and their families to help support learning at home.
National Geographic Kids	This resource is a fact-filled magazine created especially for ages 6 – 14. The students go on an amazing adventure in science, nature, culture, archaeology, and space.

Instructional Model

The structures, guidelines or model in which students engage in a particular content ensures understanding of that content.



- It is based on the constructivist learning theory, which states that learners build or construct new ideas based on their experiences.
- It represents a recursive cycle of cognitive stages in inquiry-based learning.
- Stages are intended to be completed sequentially; however, you may revisit a stage more than once during the 5E process.
- It capitalizes on hands-on activities, students' curiosity, and academic discussion among students.
- Typically, **NOT** all five stages would be experienced in a single classroom period, but all five would certainly be embedded in a series of lessons that would develop a particular concept, lasting days, or weeks.
- It should be used to develop conceptual understanding over time with each stage building on the previous stage, rather than serve as a series of activities.
- It should be used in conjunction with other instructional strategies such as writing in science, graphing, graphic organizers, collaboration, etc.