### Grade 8 – Science Overview 2019 - 2020

This document is designed to provide parents/guardians/community an overview of the curriculum taught in the FBISD classroom. It includes pacing, TEKS, Unit Overview, Big Ideas and Essential Questions, Concepts and Instructional Model.

#### Definitions

**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.

**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.

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

**Big Ideas and Essential Questions** - Big ideas create connections in learning. They anchor all the smaller isolated, facts together in a unit. Essential questions (questions that allow students to go deep in thinking) should answer the big ideas. Students should not be able to answer Essential Questions in one sentence or less. Big ideas should be the underlying concepts, themes, or issues that bring meaning to content.

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

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

#### Parent Supports

The following resources provide parents with ideas to support students’ understanding

- [Discovery Education Resources](#)
- [Khan Academy](#)
- [Texas Gateways](#)
- [NSTA – Science Resources for Parents](#)
- [National Geographic Kids](#)
- [National Geographic](#)
The 5E Instructional Model

- 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.

*Adopted Resources*

**Middle School:** [https://www.fortbendisd.com/Page/93918](https://www.fortbendisd.com/Page/93918)

**High School:** [https://www.fortbendisd.com/Page/93927](https://www.fortbendisd.com/Page/93927)

*Supplemental Resource and Tool designation*

- TI-Nspire calculator is a standardized technology integration tool used for Science and Mathematics in FBISD

*Process Standards*

The process standards in the Texas Essential Knowledge and Skills (TEKS) for mathematics, science, and social studies describe ways in which students are expected to engage with the content. These skills should be incorporated into the teaching of the TEKS when possible so that students can attain a greater depth of understanding of complex content.

The student expectations addressing scientific processes are an integral part of the TEKS for science. In the STAAR science assessments, there is not a separate reporting category for process skills. Instead, these skills will be incorporated into at least 40% of the test questions from the content reporting categories. When student expectations are reported for an administered test, both content and process student expectations will be reported for science test questions that measure a content student expectation and incorporate a process student expectation (*adapted from the TEA website*).
Grading Period 1

Unit 1: Force and Motion
Estimated Date Range: August 14 – September 17

Unit Overview:
In this unit, students will continue to investigate the effects of an unbalanced force acting on an object and how that force changes the object’s motion. Students will continue to investigate how an unbalanced force causes an object to changes its speed and direction and that these changes in direction can be calculated. Eighth graders will learn to differentiate between speed, velocity and acceleration. In addition, students will investigate and describe applications of Newton’s Three Laws of Motion and how they are applicable to everyday situations. For example, students will learn how vehicle restraints, sports activities, amusement park rides, Earth’s tectonic activities, and rocket launches demonstrate the three laws of motion.

In previous grades, students differentiated between potential (stored) energy and kinetic energy (energy in motion) and learned to identify and describe the changes in position, direction, and speed of an object when acted upon by an unbalanced force. Students also learned how to calculate speed to measure, graph and interpret these changes in motion by analyzing and comparing speed/time graphs and distance/time graphs.

Big Ideas:
- Unbalanced forces causes changes in the motion of objects.
- Newton’s three laws, in general, explain how forces cause motion in everyday situations -
  - Newton’s first law states that an object in motion will remain at a constant velocity, or an object at rest will remain at rest, unless an unbalanced force acts upon it.
  - Newton's second law describes the relationship between mass, force, and acceleration. The amount of force needed to accelerate (cause motion) an object, is determined by the object’s mass.
  - Newton's third law states that for every action force, there is an equal and opposite reaction force.

Essential Questions
- What causes objects to move?
- What is the relationship between force and motion?
- How can all Newton's law of motion be applied to every situation?

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<th>Concepts within Unit #1</th>
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<td>Concept #1: Safety</td>
<td>8.1A, 8.4A</td>
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<tr>
<td>Concept #2: Force and Motion</td>
<td>8.2B, 8.2C, 8.2D, 8.2E, 8.4A, 8.6A, 8.6B, 8.6C</td>
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Unit 2: Atomic Structure and the Periodic Table
Estimated Date Range: September 18 – October 10

Unit Overview:
Students will describe the structure of the atom (subatomic particles) and identify the charges and locations of each component. Students will review chemical and physical properties of elements (metals, nonmetals and metalloids), as this was introduced in sixth grade. Students will also spend in depth time reviewing/identifying the indicators of a chemical reaction and recognize the production of a new substance. Students will explain how this
relates to the Law of Conservation of Mass which states that mass could neither be created nor destroyed by a chemical or physical means, but should have the same numbers and kinds of atoms on both sides of a chemical equation (balanced chemical equation). In previous grades, students learned the structure of the periodic table relative to understanding groups (columns) and period (rows). In eighth grade, students will continue building on that knowledge as they investigate how the properties of elements in groups and periods are used to classify elements. Eighth graders will also identify how protons determine and element’s identity and that valence electrons determine its chemical properties, including reactivity.

**Big Ideas:**
- Atoms are the basic building block of matter
- Matter can be classified by its composition and by its physical and chemical properties
- Elements are organized based on their properties which are categorized by trends and patterns on the periodic table

**Essential Questions**
- How is the structure of an atom arranged?
- How is the Periodic Table arranged?
- How are elements classified?

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<tr>
<td>Concept #2: Periodic Table</td>
<td>8.3B, 8.3C, 8.5C</td>
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**Unit Overview:**
Eighth grade students are expected to describe the structure of atoms, including the masses, electrical charges, and locations, of protons and neutrons in the nucleus and electrons in the electron cloud. Eighth-graders need to know that most of the mass of an atom is concentrated in the nucleus and identifying protons determine an element's identity and valence electrons determine its chemical properties, including reactivity. Eighth grade students should understand that protons and neutrons make up most of the mass of the nucleus and that electrons are matter and has mass as well, but is too small being almost immeasurable. Bohr models are used to assess and understand atomic structure. Eighth grade students will use Bohr models for up to the first 10 elements only.

Eight grade students will interpret the arrangement of the Periodic Table, including groups (family/column) and periods (rows), to explain how properties are used to classify elements. Eighth grade students will recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts. They must be able to determine whether a chemical equation is balanced. To do that, they need to know how to count atoms in chemical equations. They are also expected to relate a balanced equation to the Law of Conservation of Mass. Eighth grade students will investigate how evidence of chemical reactions indicates that new substances with different properties are formed and how that relates to the law of conservation of mass.

**Big Ideas:**
- Protons, neutrons and electrons (subatomic particles) makes up an atom.
- Elements are identified by the number of protons and its physical and chemical properties.
- Valence electrons determines an element's chemical properties.
- Chemical formulas help determine the number of atoms by analyzing and counting subscripts.
- Chemical reactions are determined when a new substance has been formed and has different properties. Indicators of a chemical reaction are – fizzing, odor, color change, temperature change, formation of a precipitate.
- The atomic structure of an element determines how the element interacts with other elements.

**Essential Questions**
- What makes up an atom and what are those components called?
- How are elements identified?
- How are valence electrons and an element's chemical property related?
- How can chemical formulas help determine the number of atoms?
- What determines that a chemical reaction has taken place?
- How are chemical reactions modeled?
- How do chemical equations show the Law of Conservation of Mass?
- What happens to energy during chemical reactions?

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<td>8.1B, 8.2C, 8.2D, 8.2E, 8.3A, 8.4B, 8.5B, 8.5D, 8.5E</td>
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**Unit 4: Characteristics of the Universe**

*Estimated Date Range: November 12 – December 19*

**Unit Overview:**
In this unit, students will identify the components of the universe and classify stars using the Herzsprung-Russell diagram, explore how Electromagnetic spectrum wavelengths are used to gather information about the universe, and describe how light years is used to measure the distance between objects in space.

**Big Ideas:**
- Universe is made up of matter and energy consisting of stars, galaxies and celestial bodies
- Hertz-sprung Russell diagram is used to classify stars
- Electromagnetic Spectrum wavelengths are analyzed to gather information from the Universe
- Light years are used to measure the distance between celestial bodies

**Essential Questions**
- What are the components of the Universe?
- How do you classify stars?
- Why is the electromagnetic spectrum and light years an important tool for studying the components of the universe?

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<th>Concepts within Unit #4</th>
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<td>Concept #1: Characteristics of the Universe</td>
<td>8.1B, 8.2D, 8.2E, 8.3C, 8.3D, 8.8A, 8.8B, 8.8C</td>
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# Unit 5: Sun, Moon, and Earth Relationships

**Estimated Date Range:** January 7 – February 4

## Unit Overview:
In this unit, students will know that rotation causes night and day, along with revolution and the tilt causes seasons. Lunar phases occurs in a month, and use various models to understand Seasons and Lunar Cycle.

## Big Ideas:
- Earth’s rotation on its axis causes day and night.
- Earth’s tilt and revolution around the Sun causes change in seasons.
- The position of the moon in its orbit around the Earth, in relation to the Sun forms a predictable pattern.

## Essential Questions
- How are Earth’s days, years, and seasons related to the way Earth moves in space?
- How do Earth, the moon, and the sun affect each other?

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<td>Concept #2: Lunar Cycle</td>
<td>8.2E, 8.3B, 8.3C, 8.7B, 8.7C</td>
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# Unit 6: Earth’s Forces and Natural Impact

**Estimated Date Range:** February 5 – March 6

## Unit Overview:
In this unit, students will learn about historical development of the Plate tectonic Theory, and the tectonic plate movement in the Earth's crust results in landforms. The effects of weathering, erosion, and deposition on Earth's surface features will be studied in this unit. The students will also identify features on Earth's surface using topographic maps, and use satellite images to identify land features.

## Big Ideas:
- The Earth's crust is divided into major plates that moves in different direction.
- Each motion causes different types of features on the Earth's Crust.
- Weathering constantly reshapes Earth’s features, therefore topographic maps and satellite views can be used to identify and may predict those changes.
- Scientists use topographic maps and satellite views to identify land and erosional features.

## Essential Questions
- How does the movement of tectonic plates result in landforms?
- What is the theory of plate tectonics?
- How would you assess the impact of Earth’s natural forces on the appearance of the Earth’s surface?
- What tools can scientists use to identify land and erosional features?

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<td>Concept #1: Plate Tectonics</td>
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<td>Concept #2: Topographic Maps</td>
<td>8.2E, 8.3A, 8.3B, 8.3C, 8.9C</td>
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## TEA Middle School Science TEKS
**Grading Period 4**

**Unit 7: Earth, Ocean, and Weather Systems**  
**Estimated Date Range: March 16 – April 14**

**Unit Overview:**  
In this unit, students will know the sun provides energy that drives convection within the atmosphere and oceans, understand that the global patterns of atmospheric movement influence local weather, and recognize that weather maps are used to model patterns of atmospheric movement.

**Big Ideas:**  
- Global patterns of atmospheric movement influences weather  
- The Sun's energy is the driving force of weather  
- Weather systems is affected by the ocean  
- Different air pressures create a force that causes air to move and create the formation of fronts

**Essential Questions**  
- How do global patterns of atmospheric movement influence local weather?  
- What is the role of oceans in the formation of weather systems?  
- How does the process of convection within the atmosphere and oceans produce ocean currents and winds?

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<th>Concepts within Unit #7</th>
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<td>Concept #1: The Atmosphere</td>
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<tr>
<td>Concept #2: Oceans</td>
<td>8.2A, 8.3B, 8.4A, 8.10A, 8.10C</td>
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**Unit 8: Organisms and the Environment**  
**Estimated Date Range: April 15 – May 24 April 15 – May 28**

**Unit Overview:**  
Students will investigate and focus on organisms and populations in an ecosystem and how they depend and compete for food in an ecosystem. In addition, student will differentiate between abiotic and biotic factors and understand an organism’s ability to compete for food (biotic) and abiotic factors, quantity of light, water, range of temperature, or soil. 8th Graders will explore how short- and long-term environmental changes affect organisms and traits in subsequent populations. Although this is not a priority TEK, 8th Graders will also understand human dependence on ocean systems and explain how human activities such as runoff, artificial reefs, or use of resources have modified these systems.

**Big Ideas:**  
- Organisms and populations depend and compete for abiotic and biotic factors in different ecosystems.  
- Environmental changes affect populations and traits within the ecosystem.  
- Human activities and disturbances in the environment can affect living systems in the ecosystem.  
- The interaction between organisms in an ecosystem and how they obtain energy is necessary for life process.  
- Humans depend on ocean systems and human activities modify these systems.
Essential Questions
- Organisms and populations depend and compete for abiotic and biotic factors in different ecosystems.
- Environmental changes affect populations and traits within the ecosystem.
- Human activities and disturbances in the environment can affect living systems in the ecosystem.
- The interaction between organisms in an ecosystem and how they obtain energy is necessary for life process.
- Humans depend on ocean systems and human activities modify these systems.

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<td>Concept #1: Competition</td>
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<tr>
<td>Concept #2: Environmental Changes</td>
<td>8.2A, 8.2C, 8.2D, 8.4A, 8.11B, 8.11C</td>
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