

8th Grade Science Advanced Academic Course (AAC) 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.

- [Grading Period 1](#)
- [Grading Period 2](#)
- [Grading Period 3](#)
- [Grading Period 4](#)

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.

Process Standards:

8.1(A) demonstrate safe practices during laboratory and field investigations as outlined in Texas Education Agency-approved safety standards.

8.1(B) practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials.

8.2(A) plan and implement comparative and descriptive investigations by making observations, asking well-defined questions, and using appropriate equipment and technology.

8.2(B) design and implement experimental investigations by making observations, asking well defined questions, formulating testable hypotheses, and using appropriate equipment and technology.

8.2(C) collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers.

8.2(D) construct tables and graphs, using repeated trials and means, to organize data and identify patterns.

8.2(E) analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.

8.3(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.

8.3(B) use models to represent aspects of the natural world such as an atom, a molecule, space, or a geologic feature.

8.3(C) identify advantages and limitations of models such as size, scale, properties, and materials.

8.3(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.

8.4(A) use appropriate tools, including lab journals/notebooks, beakers, meter sticks, graduated cylinders, anemometers, psychrometers, hot plates, test tubes, spring scales,

balances, microscopes, thermometers, calculators, computers, spectrosopes, timing devices, and other necessary equipment to collect, record, and analyze information.

8.4(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: Force and Motion

Estimated Date Range: August 10 – September 15

Estimated Time Frame: 26 days

Unit Overview:

In this unit, students will review safety rules for laboratory investigations and continue to investigate the effects of an unbalanced force acting on an object and the force changes the object's motion. Students will continue to investigate how an unbalanced force causes an object to change 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 apply them 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*.

At home connections:

- Have a conversation with students about safety practices and rules/procedures that are used at home.
- Adults can ask the student to tell them real world examples for each of Newton's Laws of Motion. For example, a kid being pushed in a rolling chair would be an example of Newton's 1st law.

Concepts within Unit #1 Link to TEA Middle School Science TEKS	Success Criteria for this concept
Concept #1: Safety 8.1A, 8.4A	<ul style="list-style-type: none"> • List/describe all the general safety rules regarding conduct, clothing, accidents, glassware, heating/fire, animals, etc. • Follow all the safety rules during laboratory/field investigations
Concept #2: Force and Motion 8.2B, 8.2C, 8.2D, 8.2E, 8.4A, 8.6A, 8.6B, 8.6C	<ul style="list-style-type: none"> • Compare speed and velocity • Interpret motion graphs (distance/time and velocity/time) • Explain and give examples of acceleration of an object. • Describe how applying an unbalanced force will: <ul style="list-style-type: none"> ○ change the speed of an object ○ change the direction of an object ○ recognize that forces act as pairs ○ calculate the net force acting on an object. • Explain how Newton's First law applies to a real-world example • Explain Newton's 2nd Law of Motion • Explain how force and mass are related • Explain how force causes an object to accelerate • Provide real world examples of Newton's Third Law of Inertia • Create a scenario illustrating all of Newton's three laws of motion and describe the law within the scenario

Unit 2: Atomic Structure and the Periodic Table

Estimated Date Range: September 16 – October 6

Estimated Time Frame: 15 days

Unit Overview:

In this unit, 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 an element's identity and that valence electrons determine its chemical properties, including reactivity.

At home connections:

- Adults can ask students to point out household items that are made from the elements on the Periodic Table.
- Students can describe how a chemical or physical change has occurred when cooking a meal.

Concepts within Unit # 2 Link to TEA Middle School Science TEKS	Success Criteria for this concept
<p>Concept #1: Atomic Structure 8.3B, 8.3C, 8.5A, 8.5B</p>	<ul style="list-style-type: none"> • Explain differences between protons, electrons, and neutrons • Explain what the atomic number represents • Identify the name of an element by the number of protons, electrons, and neutrons • Determine the number of valence electrons each element contains • Interpret information presented in atomic models • Create a basic Bohr model including the nucleus and electron cloud
<p>Concept #2: Periodic Table 8.3B, 8.3C, 8.5C</p>	<ul style="list-style-type: none"> • Describe how elements are arranged on the periodic table. • Compare/contrast the following features of the periodic table including: <ul style="list-style-type: none"> ○ Periods (are horizontal and determine the number of energy levels in an atom). ○ Groups (are vertical and determine the number of valence electrons). ○ Elements (in the same group have similar chemical and physical properties). • Determine the physical properties of an element. <ul style="list-style-type: none"> ○ Metals, non-metals, and metalloids • Use Bohr models for elements 1-20 to show the arrangement of the periodic table: <ul style="list-style-type: none"> ○ Nucleus (protons and neutrons) ○ Energy levels (electrons 2,8,8,8) ○ Valence electrons • Describe why elements in the same group have similar chemical properties (reactivity): <ul style="list-style-type: none"> ○ Most reactive groups 1 & 17 ○ Least reactive/stable group 18

Grading Period 2

Unit 3: Chemical Reactions

Estimated Date Range: October 11 – November 15

Estimated Time Frame: 25 days

Unit Overview:

In this unit, students will 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 determines 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. Electrons have mass as well but are 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.

Eighth grade students will interpret the arrangement of the Periodic Table, including groups (family/column) and periods (rows), to explain how physical and chemical properties are used to classify elements. 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 need to know how to count atoms in chemical equations using subscripts. In addition, 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.

At home connections:

- Students can search the internet to find pictures showing that a chemical reaction has occurred. Students will look for pictures showing the following:
 - Production of gas
 - Change in temperature
 - Production of a precipitate
 - Color change

Concepts within Unit # 3

[Link to TEA Middle School Science TEKS](#)

Success Criteria for this concept

Concept #1 Chemical Reactions

8.1B, 8.2C, 8.2D, 8.3A, 8.4B, 8.5B, 8.5D, 8.5E

- Describe chemical properties of a newly formed substance
- Identify and describe the evidence that proves that a possible chemical change occurred, and a new substance was formed:
 - Production of gas
 - Change in temperature
 - Production of a precipitate
 - Color change
- Explain how the law of conservation of mass is illustrated in a chemical reaction
- Use chemical formulas to identify substances:
 - Identify elements in a compound and chemical formula.
 - Identify subscripts
 - Determine the number of atoms for each element.
 - Determine how many molecules of each compound are present in a chemical equation
- Use subscripts in chemical formulas to count the number of atoms of each element present

Unit 4: Characteristics of the Universe

Estimated Date Range: November 16– December 16

Estimated Time Frame: 18 days

Unit Overview:

In this unit, students in eighth grade will focus on components of the universe, including stars and their life cycles, characteristics of the three types of galaxies and how to interpret the Hertzsprung-Russell diagram to help them classify stars according to their luminosity and temperature. In eighth grade, students should recognize that the Sun is a medium-sized star and be able to explain its location in the spiral arm of the Milky Way galaxy and that it is many times closer to Earth than any other star. Students should also understand that light-year is a unit of distance and not one of time and is used to measure distance in space. In addition, eighth grade students will focus on understanding radio waves and light waves on the electromagnetic spectrum and how these waves are used to gain information about distances and the universe.

At home connections:

- Students can visit the [NASA Hubble images page](#) to identify the three types of galaxies (spiral, regular, and elliptical).
- Students can search the internet for an image of the H-R diagram. Students can identify the color, size, and temperature of the Sun.

Concepts within Unit # 4 Link to TEA Middle School Science TEKS	Success Criteria for this concept
Concept #1: Characteristics of the Universe 8.1B, 8.2B, 8.2E, 8.3C, 8.3D, 8.8A, 8.8B, 8.8C, 8.8D	<ul style="list-style-type: none"> • Describe galaxies, nebulae, and stars • Compare the masses, size and shape of galaxies, nebulae, and stars • Analyze the H-R diagram to classify stars • Describe and explain the life cycle of a star • Describe the main characteristics of the Sun including: <ul style="list-style-type: none"> ○ Location ○ Size ○ Distance from the Earth ○ Temperature and brightness • Explain how scientists use electromagnetic waves as a tool to gain information about objects' distances in the universe. • Describe the components of the universe

Grading Period 3

Unit 5: Sun, Moon, and Earth Relationships

Estimated Date Range: January 5 – February 7

Estimated Time Frame: 23 days

Unit Overview:

In this unit, eighth grade students will know that tilted Earth rotates on its axis causing day and night (1 day). The Earth makes one full revolution around the Sun (365 days) causing changes in seasons. Students will also demonstrate an understanding of the Lunar Cycle and relate the position of the Moon and Sun to predict trends and their effect on ocean tides. Students will understand that lunar phases occur throughout a month. Eighth graders will use various models to understand Seasons and the Lunar Cycle. Eighth grade students will also need to differentiate between important key terms such as rotation, revolution, waxing, waning, equinox, solstice, neap tides, and spring tides. It is important for students to use what they learn from this unit to understand the events that occur due to the relationships between the Sun, Moon, and Earth.

At home connections:

- Adults can chart the Moon phases for 30 days with students. This can include sketching what it looks like and identify the phase. If the lit part of the Moon is on the right side, then it is in the waxing phase. If the lit part of the Moon is on the left, then it is in the waning phase.

Concepts within Unit # 5 Link to TEA Middle School Science TEKS	Success Criteria for this concept
Concept #1: Seasons 8.2B, 8.2E, 8.3B, 8.3C, 8.7A	<ul style="list-style-type: none"> • Create a model to illustrate and identify the rotation of the Earth on a tilted axis to describe: <ul style="list-style-type: none"> ○ day and night ○ amount of time to complete one rotation ○ direction (counterclockwise) • Create a model to illustrate and identify the revolution of the Earth around the sun and describe: <ul style="list-style-type: none"> ○ Earth's tilt ○ seasons in relation to months ○ changes in the amount of daylight ○ amount of time to complete one revolution ○ direction (counterclockwise) • Demonstrate the following using a model: <ul style="list-style-type: none"> ○ How the Earth rotates on its axis and revolves around the sun. ○ How the rotation of the Earth causes night and day. ○ How the tilt of the Earth and revolution causes seasonal changes • Relate the number of daylight hours to a specific position on Earth as it relates to seasons
Concept #2: Lunar Cycle 8.2E, 8.3B, 8.3C, 8.7B, 8.7C	<ul style="list-style-type: none"> • Recognize and describe the phases of the moon • Demonstrate the lunar cycle using a model • Analyze and predict the lunar phases given different lunar cycle representations (i.e., graph, table, diagram, calendar) • Describe how the gravitational force of the Sun and moon are responsible for causing the tides on earth

	<ul style="list-style-type: none"> Describe and illustrate how the alignment of the sun, moon, and earth will affect the cycle of ocean tides
<p>Unit 6: Earth’s Forces and Natural Impact Estimated Date Range: February 8 – March 10 Estimated Time Frame: 21 days</p>	
<p>Unit Overview: In this unit, students will learn about the historical development of the Plate Tectonic Theory and describe how plate tectonics relates to the formation of crustal features and landforms. Students will discuss evidence that supports this theory. Eighth grade students will interpret satellite images and topographic maps and understand how these maps are used to identify land and erosional features. Students will also predict how weathering forces might reshape land features. This unit is important because students will be able to understand how past, present, and future geologic events are related to Plate Tectonics.</p> <p>At home connections:</p> <ul style="list-style-type: none"> Students can demonstrate the three types of plate movements using objects around the home or hand gestures. 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. 	
<p>Concepts within Unit # 6 Link to TEA Middle School Science TEKS</p>	<p>Success Criteria for this concept</p>
<p>Concept #1: Plate Tectonics 8.2B, 8.2E, 8.3B, 8.3C, 8.9A, 8.9B</p>	<ul style="list-style-type: none"> Demonstrate how convection in the asthenosphere (mantle) is causing lithospheric (crustal) plate movement Describe the movement of convergent boundaries, divergent boundaries, and transform boundaries Relate and describe the movement/boundary to the land features formed, such as: <ul style="list-style-type: none"> volcanic mountains fault line rift valleys mid-ocean ridge rift valleys folded mountains Explain the theory of Plate Tectonics Identify the major tectonic plates and minor plates Explain convection currents and relate it to the theory of plate tectonics
<p>Concept #2: Topographic Maps 8.2E, 8.3A, 8.3B, 8.3C, 8.9C</p>	<ul style="list-style-type: none"> Determine the elevation of a specific contour line given the contour interval Calculate the difference in elevation between two points Interpret a topographic map to determine land features and characteristics of those features Interpret satellite images to identify land features Predict how land features may be reshaped by weathering, erosion, and deposition using satellite views

Grading Period 4

Unit 7: Earth, Ocean, and Weather Systems

Estimated Date Range: March 20 – April 12

Estimated Time Frame: 16 days

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. Students will interpret high and low pressures on weather maps and understand the differentiation between weather and climate. Students will understand how scientists use tools to predict weather. This unit is important because students learn aspects of weather and the reasons why weather events occur locally as well as globally.

At home connections:

- Have students watch the weather segment on the local news or look up the local weather via the internet to determine the current weather patterns. In addition, students can look up the weather information for a place in which they want to travel or a place that they have been before.

Concepts within Unit # 7 Link to TEA Middle School Science TEKS	Success Criteria for this concept
Concept #1: Atmosphere and Oceans 8.2A, 8.3B, 8.4A, 8.10A, 8.10C	<ul style="list-style-type: none"> • Describe how the uneven heating causes convection currents in the atmosphere creating changes in pressure (wind). • Describe how the sun warms the earth unevenly. • Describe how uneven heating causes convection currents in oceans
Concept #2: Weather Patterns and Maps 8.2E, 8.3A, 8.3B, 8.3C, 8.10B	<ul style="list-style-type: none"> • Identify the characteristics of the different air masses and how that creates the different fronts • Explain how a front is formed and how it is represented on a weather map • Identify and describe the type of weather associated with high and low pressure • Describe the current weather and predict what changes will occur along the front and after the front passes using a weather map • Explain how atmospheric movement when given a global map will affect local weather

Unit 8: Organisms and the Environment

Estimated Date Range: April 13 – May 5

Estimated Time Frame: 17 days

Unit Overview:

In this unit, students will focus on organisms and populations in an ecosystem and the way they depend on and compete for food in an ecosystem. In addition, students 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 temperatures, or soil composition. Eighth graders will explore how short- and long-term environmental changes affect organisms and traits in subsequent populations. In addition, students will understand human dependence on ocean systems and explain how human activities such as runoff, artificial reefs, or use of resources have modified these systems. It is important for students to understand how organisms within an ecosystem sustain life.

At home connections:

- Adults can have a conversation with students about short-term and long-term environmental changes that have occurred in the Houston area or the state of Texas.
- Students can create a digital poster or flyer showing how to decrease human activity on the ocean systems.

Concepts within Unit # 8 Link to TEA Middle School Science TEKS	Success Criteria for this concept
Concept #1: Competition 8.2C, 8.2D, 8.3A, 8.11A	<ul style="list-style-type: none"> • Describe how organisms depend on and compete for abiotic and biotic factors to survive • Investigate the availability of certain resources and the effects on organisms and populations in an ecosystem • Analyze how organisms are affected by competition for resources
Concept #2: Environmental Changes 8.2A, 8.2C, 8.2D, 8.4A, 8.11B, 8.11C	<ul style="list-style-type: none"> • Compare short term and long-term environmental changes • Investigate how short-term environmental change could force organisms or populations to move or become extinct • Identify ways humans depend on oceans systems • Explain how human activities could affect ocean systems. • Explain how artificial reefs can have positive and negative impact to an ocean system

Student Projects

Estimated Date Range: May 8 – May 25
 Estimated Time Frame: 14 days

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.

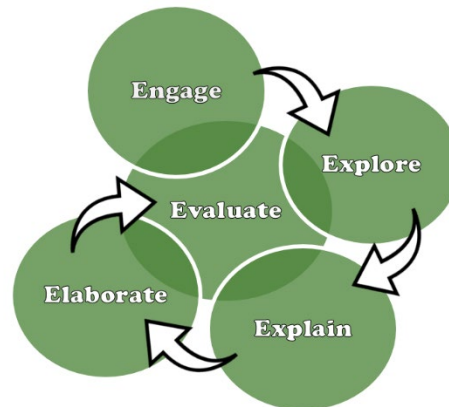
Resource	How it supports parent and students
Grade 8 Science Fusion	This is the state adopted textbook for grade 8th science. Click on the link for directions on accessing the textbook.
Khan Academy	This resource contains practice exercises, instructional videos, and a personalized learning dashboard 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.

Supplemental Resource and Tool designation

TI-Nspire Calculator	This calculator is a standardized technology integration tool used for Science and Mathematics in FBISD.
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Instructional Model

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