Grade 8 Science
Overview
2024 – 2025

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.

The process standards describe ways in which students are expected to engage in the content. The Scientific and Engineering Practices (SEPs) describe practices that students need to do in the classroom in order to learn the content. The Recurring Themes and Concepts (RTCs) describe how students need to think about the content in order to learn it.

Scientific and Engineering Practices

8.1A ask questions and define problems based on observations or information from text, phenomena, models, or investigations.
8.1B use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.
8.1C use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.
8.1D use appropriate tools such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators, hot plates, models, microscopes, slides life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, weather maps, hand lenses, and lab notebooks or journals.
8.1E collect quantitative data using the International System of Units (SI) and qualitative data as evidence.
8.1F construct appropriate tables, graphs, maps, and charts using repeated trials and means to organize data.
8.1G develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.
8.1H distinguish between scientific hypotheses, theories, and laws.
8.2A identify advantages and limitations of models such as their size, properties, and materials.
8.2B analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations.
8.2C use mathematical calculations to assess quantitative relationships in data.
8.2D evaluate experimental and engineering designs.
8.3A develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories.
8.3B communicate explanations and solutions individually and collaboratively in a variety of settings and formats.
8.3C engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.
8.4A relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content.
8.4B make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used.

8.4C research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers.

Recurring Themes and Concepts
8.5A identify and apply patterns to understand and connect scientific phenomena or to design solutions.
8.5B identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.
8.5C analyze how differences in scale, proportion, or quantity affect a system's structure or performance.
8.5D examine and model the parts of a system and their interdependence in the function of the system.
8.5E analyze and explain how energy flows and matter cycles through systems and how energy and matter are conserved through a variety of systems.
8.5F analyze and explain the complementary relationship between the structure and function of objects, organisms, and systems.
8.5G analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.

Grading Period 1

Unit 1: Matter

Estimated Date Range: August 8 – September 17
Estimated Time Frame: 28

Unit Overview:
In this unit, students delve into fundamental concepts of chemistry and properties of matter. They begin by exploring the classification of matter into elements, compounds, homogeneous mixtures, and heterogeneous mixtures. Through modeling, students learn how elements are the simplest forms of matter composed of only one type of atom, while compounds consist of two or more different elements chemically bonded together. Homogeneous mixtures, like solutions, have uniform composition throughout, whereas heterogeneous mixtures exhibit distinct phases with visible boundaries between components. This understanding helps students distinguish between different types of matter based on their physical and chemical properties, laying the groundwork for more advanced chemistry concepts.
Another critical focus is on the properties of water and their observable effects. Students study cohesion, which is the attraction between molecules of the same substance, leading to phenomena such as surface tension and the formation of droplets. Adhesion, the attraction between different substances, contributes to capillary action seen in plants and the ability of insects to walk on water due to surface tension. These properties highlight water's unique characteristics essential for life and various natural processes. By exploring these phenomena, students gain insights into how molecular interactions influence macroscopic behaviors, bridging the gap between chemical principles and everyday observations.
In addition to understanding matter classification and water properties, 8th-grade students explore the properties of acids and bases, including their contrasting characteristics and impact on pH relative to water. Acids are substances that release hydrogen ions (H^+) in aqueous solutions, whereas bases release hydroxide ions (OH^-). Students learn how acids typically have a sour taste, react with metals to produce hydrogen gas, and turn blue litmus paper red. In contrast, bases often taste bitter, feel slippery, and turn red litmus paper blue. Understanding pH, a measure of hydrogen ion concentration, helps students relate these properties to the acidic or basic nature of substances compared to water's neutral pH of 7.
Furthermore, students investigate the principle of mass conservation in chemical reactions They learn that in a closed system, mass remains constant before and after a chemical reaction, regardless of physical or chemical changes. This concept connects to the rearrangement of atoms during reactions, where substances react to form new products with atoms rearranging to conserve mass. Using the periodic table, students identify the specific atoms involved in chemical reactions and trace their roles in forming compounds or undergoing transformations.

At home connections:
Matter Classification:

- At home, you can explore different substances in your kitchen or pantry to classify them based on their composition. For example, identify elements like pure salt (sodium chloride), compounds like sugar (sucrose), and mixtures such as cereal with milk (a homogeneous mixture) or a bowl of soup with visible vegetables (a heterogeneous mixture). Creating a chart or list of these substances and discussing their properties can help reinforce the concept of classifying matter.

Properties of Water:

- To observe cohesion, adhesion, and surface tension in action, you can conduct simple experiments at home. Try placing a few drops of water on different surfaces (like glass, plastic, and wax paper) and observe how they bead up due to surface tension. You can also experiment with adding drops of water to different materials (like a paper towel, cotton cloth, and plastic spoon) to see how water adheres differently. Additionally, observing how water moves through a plant cutting placed in a glass of water can demonstrate capillary action and transport in plants.

Acids and Bases:

- At home, explore everyday substances to identify acids and bases based on their properties. For instance, test household items such as lemon juice (acidic) and baking soda dissolved in water (basic) using pH strips or indicators like red cabbage juice. Discuss how these substances taste, feel, and react with common materials (like metals or indicators) to differentiate between acids and bases. You can also relate pH levels to common beverages or foods you have at home, discussing how acidity or basicity affects taste and preservation.

Conservation of Mass in Chemical Reactions:

- At home, you can conduct simple kitchen experiments to observe conservation of mass in action. For example, you can demonstrate this principle by combining baking soda (sodium bicarbonate) and vinegar (acetic acid) in a closed plastic bag. As the two substances react, producing carbon dioxide gas, you can observe that the total mass before and after the reaction remains the same. Discuss how the mass of the reactants equals the mass of the products, emphasizing the concept of conservation of mass. Encourage students to write down their observations and measurements to reinforce the concept.

Using the Periodic Table:

- Explore the periodic table with household items or substances commonly found at home. Identify elements present in items such as table salt (sodium chloride), household cleaners, or even food items like bananas (potassium). Use the periodic table to find out more about each element's properties, including atomic number, atomic mass, and chemical symbol. Discuss how these elements might interact in different chemical reactions and how their properties contribute to the substances we encounter daily. This activity helps students connect theoretical knowledge from the periodic table to real-world applications.

Concepts within Unit #1 **Link to TEKS**	**Success Criteria for this concept** *Students will…*
Concept #1: Safety (ongoing; embedded throughout the course) Classification of Matter 8.6A	• explain the difference between elements, compounds, homogeneous mixtures, and heterogeneous mixtures. • identify examples of elements, compounds, homogeneous mixtures, and heterogeneous mixtures in everyday materials. • create models to illustrate how atoms combine to form elements and compounds. • classify given substances as elements, compounds, homogeneous mixtures, or heterogeneous mixtures based on their properties and composition
Concept #2: Properties of Water 8.6C	• describe the properties of cohesion, adhesion, and surface tension in water. • explain how cohesion and adhesion contribute to phenomena like the formation of droplets and capillary action in plants. • relate surface tension to observable phenomena, such as insects walking on water and the floating of objects on the water surface. • conduct experiments to demonstrate cohesion, adhesion, and surface tension in water and explain my observations.

Concept #3: Acids and Bases 8.6D	• compare and contrast the properties of acids and bases, including taste, feel, and reaction with indicators. • use pH indicators to test and identify acids and bases in household substances. • relate the pH scale to the relative acidity or basicity of substances compared to water (pH 7).
Concept #4: Conservation of Mass 8.6B, 8.6E	• explain the principle of conservation of mass in chemical reactions. • conduct experiments to demonstrate conservation of mass in different chemical reactions, recording mass measurements before and after reactions. • describe how the rearrangement of atoms in chemical reactions maintains the total mass of the reactants and products. • use chemical equations to illustrate how atoms are rearranged during reactions while ensuring mass conservation. • use the periodic table to identify the atoms involved in chemical reactions. • locate elements on the periodic table by their atomic number and symbol.

Unit 2: Force and Motion

Estimated Date Range: September 18 – October 9
Estimated Time Frame: 14

Unit Overview:

In this unit, 8th-grade students explore the intricacies of motion through the lens of Newton's laws. The focus begins with students delve into Newton's Second Law of Motion, learning to calculate and analyze the relationship between an object's acceleration, the net force acting on it, and its mass. They engage in hands-on experiments and problem-solving activities to apply the formula F=ma, demonstrating how varying the force or mass affects acceleration. By connecting these calculations to everyday scenarios and technological applications, students gain a robust understanding of the principles that dictate motion in our world, preparing them for more advanced studies in physics. Students explored Newton's Third Law of Motion in 6th grade and Newton's First Law of Motion in 8th grade.

Building on this foundation, of Newton's Laws of Motion, students investigate how they act simultaneously within various systems. Students examine real-world applications such as vehicle restraints, where seat belts demonstrate Newton's First Law by restraining passengers during sudden stops. In sports activities, they explore how players use Newton's Second Law to enhance performance, applying force to change the motion of balls and equipment. Amusement park rides provide vivid examples of all three laws, showcasing inertia, acceleration, and action-reaction forces. Additionally, the unit covers Earth's tectonic activities and rocket launches, illustrating how these laws govern the movement of massive plates and the propulsion of rockets.

At home connections:

Vehicle Restraints: Discuss the importance of seat belts in a car. Explain how seat belts work using Newton's First Law (inertia). Conduct a simple experiment with a small toy car and a figurine to show how the figurine continues moving forward when the car stops suddenly if it's not secured.

Sports Activities: Observe and analyze sports activities, such as throwing a ball or running. Discuss how Newton's laws apply, such as how force (kick or throw) affects the ball's motion (Second Law) and how every action has an equal and opposite reaction (Third Law) when players push off the ground to jump or run.

Amusement Park Rides: If visiting an amusement park, discuss how Newton's laws apply to rides. For example, roller coasters demonstrate inertia (First Law) when cars move along tracks and the effects of acceleration and force (Second Law) in loops and turns.

Tectonic Activities: Use a simple model with blocks or pieces of wood to simulate tectonic plates. Push them against each other to show how force causes movement and discuss how this relates to earthquakes (Third Law: action and reaction forces).

Rocket Launches: Launch a small model rocket or use a balloon to demonstrate how rockets work. Explain how the release of air from the balloon or exhaust from the rocket (Third Law) propels it forward.

Household Objects: Find objects of different masses (e.g., a tennis ball and a basketball) and push them with the same force. Observe and compare how quickly they accelerate and discuss how mass affects acceleration.

Concepts within Unit #2	Success Criteria for this concept

Link to TEKS	*Students will…*
Concept #1: Newton's Laws of Motion (1st and 3rd) 8.7B	• explain Newton's First Law of Motion (inertia) and provide examples of how it applies to vehicle restraints, such as seat belts. • describe Newton's Second Law of Motion and analyze its application in sports activities, showing how force and mass affect acceleration. • identify examples of Newton's Third Law of Motion (action-reaction) in amusement park rides, Earth's tectonic activities, and rocket launches.
Concept #2: Newton's Second Law (Acceleration)	• state Newton's Second Law of Motion and use the formula F=ma to calculate force, mass, or acceleration. • conduct experiments to measure the acceleration of objects with different masses when a constant force is applied. • analyze data from experiments to explain how changes in force and mass affect an object's acceleration. • solve problems involving Newton's Second Law by calculating the net force, mass, or acceleration of an object in various scenarios. • apply my understanding of Newton's Second Law to real-life situations, explaining how it affects the motion of objects in everyday activities.

Grading Period 2

Unit 2: Force and Motion (continued)

Estimated Date Range: October 16 – October 22
Estimated Time Frame: 5 days

Unit Overview: (see above for Unit 2)

At home connections: (see above for Unit 2)

Concepts within Unit #2 **Link to TEKS**	**Success Criteria for this concept** *Students will…*
Concept #3: Newton's Three Laws of Motion 8.7B	• investigate and describe how all three of Newton's laws act simultaneously in real-world systems, such as during an earthquake or a rocket launch. • conduct experiments or use models to demonstrate the simultaneous action of Newton's laws in various scenarios and explain my observations.

Unit 3: Waves

Estimated Date Range: October 23 – November 15
Estimated Time Frame: 16

Unit Overview:
In this unit, students explore the fundamental characteristics and applications of transverse waves, with a particular focus on the electromagnetic spectrum. Students begin by comparing the key properties of amplitude, frequency, and wavelength in transverse waves. They learn that amplitude refers to the height of the wave, indicating its energy; frequency is the number of waves that pass a point in a given period, determining the wave's pitch or color; and wavelength is the distance between successive wave crests, influencing the type of wave within the electromagnetic spectrum. Through hands-on activities and visual aids, students observe these properties and understand their interrelationships, gaining a solid foundation in wave dynamics. Building on this foundation, students delve into the diverse applications of electromagnetic waves. They examine how different parts of the electromagnetic spectrum are utilized in various technologies and processes. For example, they explore the use of radiation therapy in medical treatments, wireless technologies for communication, fiber optics for data transmission, and microwaves for cooking. Additionally, students learn about the role of ultraviolet waves in sterilization, the importance of different wavelengths in astronomical observations, and the diagnostic power of X-rays. By connecting the properties of electromagnetic waves to their practical uses, students gain an appreciation for the pervasive role of these waves in modern life and technology.

At home connections:

- **Water Waves:** Fill a large container with water and create waves by gently tapping the surface. Observe how the height of the waves (amplitude) changes with different amounts of force. Measure the distance between wave crests (wavelength) and count how many waves pass a point in a set time (frequency). Discuss how these characteristics relate to the energy of the waves.
- **Slinky Experiment:** Use a slinky to demonstrate transverse waves. Stretch the slinky out on the floor and create waves by moving one end up and down. Observe the amplitude (how high the waves go), wavelength (distance between waves), and frequency (how often waves occur). This helps visualize the properties of transverse waves.
- **Light Waves:** Use a prism or a glass of water to create a rainbow. Discuss how different colors of light have different wavelengths and frequencies. Relate this to the electromagnetic spectrum and how visible light is just a small part of it.
- **Microwave Cooking:** Discuss how microwaves are used in cooking. Heat food in a microwave and explain how the microwaves excite water molecules, heating the food. Relate this to the specific part of the electromagnetic spectrum.

- **Wireless Technology:** Explore the use of wireless technology in everyday devices. Discuss how smartphones, Wi-Fi, and Bluetooth use electromagnetic waves to transmit information. Connect this to the concept of radio waves and their place in the electromagnetic spectrum.
- **UV Sterilization:** Discuss the use of ultraviolet light for sterilization. Use a UV light (if available) to demonstrate how it can kill bacteria on surfaces, emphasizing the role of UV waves in medical and cleaning applications.
- **Astronomical Observations:** Use a smartphone app to observe the night sky and discuss how different types of electromagnetic waves (radio waves, infrared, visible light, etc.) are used by astronomers to study celestial objects. This can help students understand the wide range of wavelengths used in space exploration.
- **X-rays:** Discuss how X-rays are used in medical imaging. If possible, show an X-ray image (such as from a dental visit) and explain how X-rays pass through soft tissue but are absorbed by denser materials like bones, creating an image

Concepts within Unit # 3 Link to TEKS	**Success Criteria for this concept**
Concept #1: Characteristics of Waves 8.8A	• define amplitude, frequency, and wavelength and explain how they relate to transverse waves. • measure and compare the amplitude, frequency, and wavelength of different transverse waves using appropriate tools and methods. • can describe how changes in amplitude, frequency, and wavelength affect the energy and behavior of transverse waves.
Concept #2: Electromagnetic Spectrum 8.8A	• can explain how different parts of the electromagnetic spectrum correspond to different wavelengths and frequencies. • can provide examples of transverse waves from different parts of the electromagnetic spectrum, such as visible light, radio waves, and X-rays, and compare their characteristics.
Concept #3: Electromagnetic Waves and Applications 8.8B	• identify different types of electromagnetic waves and their place in the electromagnetic spectrum. • explain how electromagnetic waves are used in various applications, including radiation therapy, wireless technologies, fiber optics, and microwaves. • describe the role of ultraviolet light in sterilization and the importance of X-rays in medical imaging. • discuss how electromagnetic waves are used in astronomical observations to study the universe. • connect the properties of specific electromagnetic waves (such as wavelength and frequency) to their practical applications in everyday life and technology.

Unit 4: The Universe

Estimated Date Range: November 18 – December 20
Estimated Time Frame: 20 days

Unit Overview:
In this unit, students embark on a journey through the cosmos, exploring the fascinating life cycle of stars, the classification of galaxies, and the scientific theories describing the origin of the universe. The unit begins with an in-depth look at the life cycle of stars, from their birth in stellar nurseries to their various endpoints as white dwarfs, neutron stars, or black holes. Students use the Hertzsprung-Russell (H-R) diagram to compare and classify stars based on their luminosity, temperature, and size, understanding how these characteristics change over a star's lifetime. By plotting stars on the H-R diagram, they gain insights into the stages of stellar evolution and the diversity of stellar types.
The exploration continues with a focus on galaxies, where students learn to categorize them into spiral, elliptical, and irregular types. They study the distinctive features of each galaxy type and locate our own Milky Way galaxy within this framework. Students explore the structure of the Milky Way, identifying the position of Earth's solar system within one of its spiral arms. The unit culminates with an investigation into the origin of the universe. Students research and analyze scientific data supporting various theories and examine the evidence that has led to our current understanding of the universe's beginnings.

At home connections:
- Create a model or diagram at home to represent the life cycle of a star. Use different household materials to depict stages such as nebula, main sequence, red giant, supernova, and black hole.
- Create models of different types of galaxies (spiral, elliptical, irregular) using craft materials. Compare the shapes and structures of each type.
- Use online resources or apps to visualize the Milky Way galaxy. Identify the location of Earth's solar system within one of the spiral arms.

Concepts within Unit #4 **Link to TEKS**	**Success Criteria for this concept** *Students will…*
Concept #1: Stars 8.9A	• describe the stages in the life cycle of a star, from its formation in a nebula to its end as a white dwarf, neutron star, or black hole. • use the Hertzsprung-Russell diagram to compare the luminosity, temperature, and size of different stars. • classify stars based on their position in the Hertzsprung-Russell diagram, identifying main sequence stars, giants, supergiants, and white dwarfs. • explain how a star's characteristics change as it moves through different stages of its life cycle. • provide examples of stars at different stages of their life cycle and plot them on the Hertzsprung-Russell diagram.
Concept #2: Galaxies 8.9B	• identify and describe the characteristics of spiral, elliptical, and irregular galaxies. • categorize images of galaxies into spiral, elliptical, and irregular types based on their shape and structure. • explain the structure of the Milky Way galaxy and identify the location of Earth's solar system within one of its spiral arms. • compare and contrast the features of different types of galaxies, including their shape, size, and star composition. • discuss how the classification of galaxies helps astronomers understand the universe's structure and evolution.
Concept #3: Theories of the Universe 8.9C	• explain how evidence, such as cosmic microwave background radiation and galaxy redshift, supports scientific theories about the universe. • analyze data to find patterns that support ideas about the universe's structure, motion, and changes over time.

	• research key discoveries that have shaped current scientific understanding of the universe. • describe how new evidence leads to changes or improvements in scientific ideas about the universe. • evaluate how scientific tools help gather evidence to better understand the universe.

Grading Period 3

Unit 5: Climate and Weather

Estimated Date Range: January 9 – February 4
Estimated Time Frame: 18 days

Unit Overview:
In this unit, students investigate the dynamic interactions between solar energy, the hydrosphere, and the atmosphere, and how these interactions shape weather and climate. The unit begins with an exploration of how energy from the Sun drives weather patterns and climate systems. Students learn how solar radiation heats the Earth's surface unevenly, creating temperature gradients that influence atmospheric and oceanic circulation. By examining the roles of the hydrosphere and atmosphere, students gain a comprehensive understanding of how these spheres interact to distribute heat and moisture around the planet, leading to various weather phenomena and climate zones.
Building on this foundation, students delve into the study of global atmospheric movement patterns and their impact on local weather. They identify key features such as trade winds, jet streams, and prevailing westerlies, and analyze how these patterns drive weather systems and influence regional climates. The unit then focuses on the interactions between ocean currents and air masses, emphasizing their role in producing tropical cyclones, including typhoons and hurricanes. Students explore how warm ocean waters provide the energy necessary for cyclone formation and how atmospheric conditions steer and intensify these powerful storms.

At home connections:
- Observe and record daily temperature changes outside your home. Discuss how the angle of sunlight and cloud cover affect temperature variations throughout the day.
- Conduct a simple experiment to demonstrate the water cycle. Use a container with water, cover it with plastic wrap, and observe condensation and precipitation over a few days. Discuss how energy from the Sun drives this cycle.
- Create a mini greenhouse using a clear plastic container and place a plant inside. Monitor temperature changes inside the greenhouse compared to outside to understand how the greenhouse effect works.
- Use online weather maps or weather apps to track global atmospheric patterns. Identify and discuss the locations of high and low-pressure systems, jet streams, and prevailing winds.
- Use a fan or create wind with a hairdryer to simulate wind patterns. Place objects such as paper strips or feathers to observe how they move and explain how global atmospheric circulation patterns influence local weather.
- Research how tropical cyclones form and track their paths using online resources or weather websites. Create a timeline or map of a historical cyclone's path and discuss its impact.
- Use a large bowl of water and add ice cubes to one side to simulate a cold ocean current. Use a dropper to add warm water to the opposite side to simulate a warm current. Observe how the currents interact and discuss their influence on local weather patterns.
- Use online resources or apps to track current tropical cyclones (if any) around the world. Discuss how ocean temperatures Monitor local weather forecasts for a week and compare predicted weather patterns with actual weather conditions. Discuss how global atmospheric movements influence weather changes in your region.

Concepts within Unit #5 Link to TEKS	**Success Criteria for this concept** *Students will…*
Concept #1: Energy in the Atmosphere 8.10A	• explain how solar energy drives the water cycle, including processes such as evaporation, condensation, and precipitation. • describe how the uneven heating of Earth's surface by solar radiation creates temperature variations and influences atmospheric circulation. • identify and explain the roles of the hydrosphere (oceans, lakes, rivers) and atmosphere in distributing heat and moisture around the Earth. • analyze how interactions between solar energy, the hydrosphere, and the atmosphere contribute to different weather patterns and climate zones. • provide examples of how solar energy interacts with the atmosphere to produce phenomena such as greenhouse gases and global warming.

Concept #2: Global Patterns of Atmospheric Movement 8.10B, 8.10A	• identify and describe major global atmospheric circulation patterns, including trade winds, jet streams, and prevailing westerlies. • explain how high-pressure and low-pressure systems influence weather patterns and movement of air masses globally. • analyze how global atmospheric circulation patterns impact local weather conditions, including temperature, precipitation, and wind patterns. • use weather maps and data to predict and explain changes in local weather based on global atmospheric movements. • compare and contrast how different regions of the world experience weather changes due to variations in global atmospheric circulation.
Concept #3: Interactions between Ocean and Weather Systems 8.10C	• explain how warm ocean currents provide energy for tropical cyclone formation. • describe the role of atmospheric conditions, such as low-pressure systems and high humidity, in the development and intensification of tropical cyclones. • identify and explain the stages of tropical cyclone development, including tropical depression, tropical storm, and hurricane/typhoon. • analyze how interactions between ocean currents and atmospheric conditions contribute to the path and intensity of tropical cyclones. • compare and contrast tropical cyclones in different regions of the world and their impact on coastal areas and communities.

Unit 6: Impact on Global Climate

Estimated Date Range: February 5 – March 7
Estimated Time Frame: 20 days

Unit Overview:

In this unit, students explore the dynamic processes that shape Earth's surface and climate over geological time scales. The unit begins by examining the evidence supporting the concept that Earth has changed over time, focusing on geological formations and fossil records. Students learn about the theory of plate tectonics, which explains how Earth's lithosphere is divided into plates that move and interact, leading to various geological phenomena. They explore evidence such as fossil distribution and matching coastlines and rock formations across continents to understand how plate movements have shaped Earth's landforms and influenced the distribution of species.

Building on this foundation, students delve into the mechanisms through which plate tectonics drives geological events. They study how plate movements cause ocean basin formation through processes like seafloor spreading and subduction. They also investigate how plate interactions result in earthquakes along faults, mountain building through collision zones, and volcanic eruptions at convergent and divergent boundaries, including supervolcanoes and hot spots like Yellowstone.

The unit then shifts focus to the influence of natural and human-induced factors on Earth's climate. Students analyze scientific evidence to understand how natural events such as volcanic eruptions, meteor impacts, changes in ocean currents, and the cycling of greenhouse gases affect global climate patterns. They explore the carbon cycle, examining how carbon is exchanged between the atmosphere, oceans, and biosphere, and its role in regulating Earth's climate.

Finally, students investigate human activities that could contribute to climate change, including the release of greenhouse gases through industrial processes and deforestation, as well as the impact of urbanization on local and regional climates.

At home connections:

- Use layers of colored clay or playdough to create a model of rock layers. Experiment with pushing the layers together and pulling them apart to simulate plate movements and observe how this affects the layers and fossil distribution.

- Use Google Earth or similar tools to explore satellite images of Earth's surface. Identify mountain ranges, coastlines, and geological formations that support the theory of plate tectonics and continental drift.
- Create a simple model using cardboard and markers to represent tectonic plates. Move the plates relative to each other to demonstrate how divergent, convergent, and transform boundaries lead to ocean basin formation, earthquakes, mountain building, and volcanic eruptions.
- Conduct a volcano eruption simulation using baking soda and vinegar. Discuss how volcanic eruptions are linked to plate boundaries and hot spots, such as the Hawaiian Islands.
- Build a model of a cityscape using blocks or Legos. Use a small vibrating device or shake the table to simulate an earthquake. Discuss how earthquakes result from the movement of tectonic plates and their impact on human structures.
- Conduct an energy audit at home, noting energy consumption from appliances, lighting, and heating. Discuss how energy use could contribute to greenhouse gas emissions and explore energy-saving strategies.

Concepts within Unit #6 **Link to TEKS**	**Success Criteria for this concept** *Students will…*
Concept #1: Plate Tectonics (overlap curriculum eligible to be assessed on STAAR in the 2024-2025 school year per TEA) 7.10A, 7.10B	• explain how fossil evidence provides clues about past environments and life forms on Earth. • describe the theory of plate tectonics and how it explains the movement of Earth's lithospheric plates. • apply the principle of superposition to interpret the relative ages of rock layers and fossils. • analyze how matching coastlines and geological formations across continents support the theory of continental drift. • create diagrams or models to illustrate how plate tectonics has influenced Earth's surface features over geological time. • explain how divergent boundaries lead to seafloor spreading and the formation of ocean basins. • describe how convergent boundaries result in subduction zones, mountain building, and volcanic arcs. • analyze the relationship between transform boundaries and earthquakes along fault lines. • identify examples of supervolcanoes and hot spots and explain their formation and geological significance. • use diagrams or simulations to illustrate different types of plate boundaries and their associated geological processes
Concept #2: Natural Events and Climate 8.11A, 8.11B, 8.11C	• describe the impact of volcanic eruptions on climate through the release of ash and gases that affect sunlight penetration. • explain how meteor impacts can cause short-term climate changes by creating dust clouds that block sunlight. • analyze how abrupt changes in ocean currents, such as El Niño events, influence regional and global weather patterns. • describe the role of greenhouse gases, such as CO_2 and methane, in trapping heat in Earth's atmosphere. • use scientific data and case studies to support my explanations of how these natural events could affect climate variability over time.
Concept #3: Human Activity and Climate 8.11B	• explain how the burning of fossil fuels releases CO_2 and other greenhouse gases that contribute to the greenhouse effect. • describe the impact of deforestation on carbon storage, biodiversity, and regional climate patterns. • analyze how urbanization could affect local climates through the urban heat island effect and changes in land use.

Grading Period 4

Unit 7: Organisms

Estimated Date Range: March 17 – April 2
Estimated Time Frame: 12 days

Unit Overview:
In this unit, students will explore how cells work and how traits are passed down. They'll start by learning about the parts of cells like the cell membrane, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts (in plants), and vacuoles. They will see how each part helps the cell do important jobs like making energy, building proteins, and keeping its shape.
Next, students will look at how traits are inherited. They'll learn that traits, like eye color or hair texture, are passed from parents to children through special instructions called genes. These genes are found in chromosomes inside the cell. Students will explore how different traits can show up, even if they're not always visible in everyone.

The unit ends by exploring how living things can change over time to better fit their environments. Students will see how small differences in traits can help animals and plants survive and have offspring that are more likely to survive too.

At home connections:
- DIY Cell Model: Create a model of a plant or animal cell using household materials like clay, playdough, or even food items like fruits or vegetables. Label each part (cell membrane, nucleus, mitochondria, etc.) and explain what each part does to someone at home.
- Cell Scavenger Hunt: Look around your house or outside and find objects that resemble different cell parts. For example, a bowl could represent a vacuole, and a balloon could represent a cell membrane. Explain why you chose each object.
- Adaptation Story: Write a short story or draw a comic strip about an animal or plant that has adapted to its environment. Include how its traits help it survive in its habitat

Concepts within Unit #7 **Link to TEKS**	**Success Criteria for this concept** *Students will…*
Concept #1: Cell Function and Inherited Traits 8.13A, 8.13B	• identify and describe the function of key cell organelles such as the cell membrane, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts (in plants), and vacuoles. • create a model of a plant or animal cell that includes labeled organelles and explain their functions to someone else. • describe how traits like eye color or hair texture are passed down from parents to offspring through genes. • explain that genes are found in chromosomes inside cells and how they carry instructions for specific traits.
Concept #2: Genetic Variation and Adaptations 8.13C	• adaptation as a feature or behavior that helps an organism survive and thrive in its environment. • describe examples of adaptations in plants and animals, such as camouflage or migration, and explain how these adaptations help them survive. • observe plants and animals in my backyard or local area and record adaptations I notice, like special behaviors or physical features. • create a story or comic strip about an animal or plant and illustrate how its adaptations help it survive in its habitat.

Unit 8: Interaction within an Ecosystem

Estimated Date Range: April 3 – April 25
Estimated Time Frame: 23 days

Unit Overview:
In this unit, 8th-grade students will explore the intricate dynamics of ecosystems, focusing on how disruptions impact energy transfer and biodiversity. They will begin by studying the flow of energy in food webs and how disruptions such as population changes, natural disasters (like wildfires or hurricanes), and human activities could alter this balance. Students will investigate how these disruptions affect the availability of resources and the relationships between organisms in ecosystems, influencing predator-prey dynamics and overall ecosystem health.
Moving forward, students will delve into ecological succession, examining how ecosystems recover and evolve following disturbances. They will learn about primary succession, where new communities establish in previously barren environments (e.g., after volcanic eruptions), and secondary succession, which occurs in areas where existing communities have been disrupted (e.g., after forest fires). Students will analyze how these processes shape populations and species diversity over time, observing how different species adapt and thrive in changing ecological conditions.

Through these studies, students will gain a deeper understanding of the resilience of ecosystems, the importance of biodiversity in maintaining ecosystem stability, and the impacts of human actions on natural environments. They will explore strategies for conserving biodiversity and promoting sustainable practices to support healthy ecosystems for future generations.

At home connections:

- Ecosystem Impact Report: Choose a local ecosystem (e.g., a park, a pond, or a backyard garden) and research any recent disruptions it has experienced. Create a report or presentation outlining how these disruptions have affected the ecosystem's energy flow and biodiversity.
- Create a mini experiment at home to simulate ecological succession. Use a small container with soil or sand, plant seeds or small plants, and introduce disturbances (e.g., rearranging plants, adding, or removing water). Observe and document how the community changes over time, noting different stages of succession.
- Research local conservation efforts or organizations focused on protecting biodiversity. Explore ways you can contribute to biodiversity conservation at home, such as creating a wildlife-friendly garden or participating in community clean-up events.

Concepts within Unit #8 **Link to TEKS**	**Success Criteria for this concept** *Students will…*
Concept #1: Flow of Energy 8.12A	• describe how changes in population sizes, natural disasters, and human activities affect the flow of energy in food webs. • explain how disruptions alter the availability of resources and impact predator-prey relationships within ecosystems. • provide examples of disruptions and their specific effects on energy transfer in different types of ecosystems.
Concept #2: Changes in Ecosystems 8.12B	• define primary succession and describe how it occurs in environments like newly formed volcanic islands or barren landscapes. • define secondary succession and explain how it occurs in ecosystems recovering from disturbances such as forest fires or abandoned agricultural fields. • analyze how ecological succession shapes populations and species diversity over time, identifying stages of succession and their characteristics.
Concept #3: Stability in Ecosystems 8.12C	• define biodiversity and explain its importance in maintaining ecosystem stability and resilience.

	• describe how a diverse array of species contributes to ecosystem functions such as nutrient cycling, pollination, and pest control. • Describe how human activities could impact biodiversity and propose strategies for conserving and promoting biodiversity in local ecosystems.
Student Projects Estimated Date Range: April 28 – May 29 Estimated Time Frame: 23 days	
Scientific and Engineering Practices 8.1A ask questions and define problems based on observations or information from text, phenomena, models, or investigations. 8.1B use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems. 8.3 develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories. 8.4A relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content. 8.4C research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers.	

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
Texas Experience Science Grade 8	This is the state adopted textbook for grade 8 science. Students sign in through their school account in Clever.
EduSmart	This resource provides hand-on and vocabulary activities that are great to review the concepts learned in the classroom. Students sign in through their school account in Clever.
Khan Academy	This resource contains practice exercises, instructional videos, and a personalized learning dashboard where students can learn and study at their own pace.
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.

Instructional Model

An instructional model is the structure in which students engage in a particular content that ensures understanding of that content. In science, the instructional model is the 5E Instructional Model.

The 5E Model is an inquiry-based approach to teaching and learning science concepts over time. It is research-based and emphasizes that children build conceptual understanding and make meaning through experiences. Each "E" represents a stage in a learning cycle.

- Engage: Students interact with a phenomenon that sparks curiosity and assesses prerequisite knowledge or misconceptions.
- Explore: Students begin to interact with the content through hands-on investigations.
- Explain: Students connect the hands-on experience to the instruction of the concept using grade level appropriate academic vocabulary.
- Elaborate: Students apply the concept learned to a new context through problem solving or an additional hands-on experience.
- Evaluate: Evaluation of student understanding and progress occurs throughout the learning cycle.

As students learn each concept in the curriculum, they will have the opportunity to develop conceptual understanding as the teacher navigate the content as telling a story. The graphic below summarizes each component that occurs within each of the 5E stages.