Grade 7 AAC 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.

- Grading Period 1
- Grading Period 2
- Grading Period 3
- Grading Period 4

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

7.1A ask questions and define problems based on observations or information from text, phenomena, models, or investigation
7.1B use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems
7.1C use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards
7.1D 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, hand lenses, and lab notebooks or journals
7.1E collect quantitative data using the International System of Units (SI) and qualitative data as evidence
7.1F construct appropriate tables, graphs, maps, and charts using repeated trials and means to organize data
7.1G develop and use models to represent phenomena, systems, processes, or solutions to engineering problems
7.1H distinguish between scientific hypotheses, theories, and laws
7.2A identify advantages and limitations of models such as their size, properties, and materials
7.2B analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations
7.2C use mathematical calculations to assess quantitative relationships in data
7.2D evaluate experimental and engineering designs
7.3A develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories
7.3B communicate explanations and solutions individually and collaboratively in a variety of settings and formats
7.3C engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence

Contribution of Scientists and Scientific Research:
7.4A 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
7.4B make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used
7.4C 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
7.5A identify and apply patterns to understand and connect scientific phenomena or to design solutions.
7.5B identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.
7.5C analyze how differences in scale, proportion, or quantity affect a system's structure or performance.
7.5D examine and model the parts of a system and their interdependence in the function of the system.
7.5E analyze and explain how energy flows and matter cycles through systems and how energy and matter are conserved through a variety of systems.
7.5F analyze and explain the complementary relationship between the structure and function of objects, organisms, and systems.
7.5G 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 18
Estimated Time Frame: 29 days

Unit Overview:
In this unit, students will explore the fascinating world of matter, exploring its properties, states, and changes. Through hands-on experiments, discussions, and inquiry-based activities, students will deepen their understanding of the fundamental building blocks of the universe. The unit will cover topics such as the classification of matter, physical and chemical properties, states of matter, changes in matter, and the conservation of mass.

At home connections:
Laboratory Safety

- Always ensure that an adult supervises any experiments conducted at home.
- Wear appropriate protective gear, including gloves and aprons, to protect against spills, splashes, and other hazards.
- Keep workspace clear of clutter. Only have the materials needed for the experiment on hand.
- Read all instructions carefully and adhere to any safety warnings before starting any experiment.
- Understand how to use and handle equipment. Check for cracks, breaks, or other damages in glassware or other equipment.

Physical and Chemical Properties

- Physical properties can be observed or measured without changing the substance's identity.
- States of Matter: (Solid, liquid, and gas) Discuss the different states of matter and observe examples at home (ice, water, steam). A possible activity could include observe the melting of ice or the boiling of water. Discuss how these processes demonstrate changes in state.
- Density: Density is the mass per unit volume of a substance. A possible activity is comparing the density of different liquids (e.g., water, oil, syrup) by pouring them into a clear container to see how they layer.
- Solubility: Solubility is the ability of a substance to dissolve in another substance. A possible activity could be to dissolve salt or sugar in water and observe. Compare this with how oil does not dissolve in water.
- Chemical properties describe a substance's ability to undergo changes that transform it into different substances.

- Reactivity: Reactivity is how easily a substance undergoes chemical changes. A possible activity could be to mix vinegar and baking soda to observe a chemical reaction (formation of carbon dioxide gas).

Types of Mixtures

- Mixtures can be classified into two main types: homogenous and heterogenous.
- A homogenous mixture has the same uniform appearance and composition throughout. The individual components are not visibly distinguishable. Examples include water, air, and vinegar.
- Saltwater - A possible activity could be to dissolve table salt in water and until its completely dissolved. Discuss how the salt is evenly distributed throughout the water.
- Making a sugar solution – A possible activity could be to dissolve sugar in water and observe how the sugar disappears, forming a uniform solution.
- A heterogenous mixture consists of visible different substances or phases. The components are not uniformly distributed. Examples include salad, trail mix, sand and iron filings.
- Creating a trail mix: mix different nuts, raisins, and chocolate chips. Observe and discuss how each component remains separate and visible.
- Sand and Iron Filings: mix sand and iron filings. Use a magnet to separate the iron filings from the sand, demonstrating how the components remain distinct.

Concepts within Unit #1 **Link to MS Science TEKS**	**Success Criteria for this concept** *Students will…*
Concept #1: Safety (ongoing; embedded throughout the course) 7.1C, 7.1B, and 7.1D	• Locate and describe the use of safety equipment. • Follow all the safety rules during laboratory/field investigations. • Use laboratory equipment in an appropriate manner. • Participate in the conservation and disposal of materials
Concept #2: Physical and Chemical Properties 7.6A, 7.6B	• Explain compounds as pure substances made of two or more elements chemically combined and represented by a chemical formula. (NaCl, H_2O, $C_6H_{12}O_6$). • Locate an element, using the chemical symbol, on the periodic table. • Explain how elements on the Periodic Table are represented by a chemical symbol.

Concept #3:
Physical and Chemical Changes
 	
7.6C
	• Explain a physical change and chemical change.
	• Create accurate models to represent physical and chemical changes.
	• Interpret experimental data to identify patterns and draw conclusions about physical and chemical changes
	• Recognize patterns in physical and chemical changes across different substances and conditions
	• Identify and describe the evidence that proves that a possible chemical change occurred, and a new substance was formed, through a lab investigation:
	  ○ Production of gas
	  ○ Change in temperature
	  ○ Production of a precipitate (define precipitate)
	  ○ Color change

Concept #4: Types of Mixtures 7.6D, 7.6E	• Define mixtures and identify examples of mixtures in everyday life. • Classify mixtures into homogeneous and heterogeneous categories based on their visual appearance and uniformity of composition. • Explain methods used to separate different types of mixtures, such as filtration, evaporation, distillation, and chromatography. • Plan and conduct investigations to explore the properties and behavior of mixtures, making careful observations and collecting data. • Use appropriate measurement tools and units to quantify the amount of substances in mixtures accurately.

Unit 2: Force and Motion

Estimated Date Range: September 19 – October 9
Estimated Time Frame: 13 days

Unit Overview:

In the Force and Motion unit, students will explore the fundamental principles of physics that govern the motion of objects. Through hands-on experiments, demonstrations, and interactive activities, students will investigate concepts such as balanced and unbalanced forces, displacement, average speed, velocity, and Newton's First Law of Motion. They will develop a deep understanding of how forces affect the motion of objects and apply their knowledge to analyze real-world scenarios.

At Home Connections:

Linear Motion

- Linear motion is a key concept that describes objects moving along a straight path.
- Distance: the total path length traveled by an object.
- Displacement: The straight-line distance from the starting point to the ending point in a specific direction.
- Speed: the rate at which an object covers distance. It is a scalar quantity (ex: 5 meters per second).
- Velocity: speed with a direction. (ex. 5 meters per second North).
- Measuring Speed activity: measure the time it take for an object to travel a known distance. Materials needed are stopwatch, measuring tape, toy car or ball.
  - Measure a straight path (ex. 5 meters)
  - Roll a toy car or ball along the path.
  - Use a stopwatch to time how long it take to travel the distance.
  - Calculate the speed using the formula Speed = $\frac{\text{Distance}}{\text{Time}}$
- Graphing Motion: Create a distance-time graph to visualize motion. Materials needed are graph paper, stopwatch, measuring tape, toy car or ball.
  - Measure a straight path.
  - Roll a toy car or ball along this path and time it at various points (ex. every meter).
  - Plot the distance on the y-axis and time on the x-axis of the graph paper.
  - Draw a line connecting the points to visualize the motion.

Newton's First Law of Motion

- Newton's First Law of Motion, often called the law of inertia, is a foundational concept in physics that is accessible and fun to explore at home.
- Newton's First Law of Motion: An object at rest will stay at rest, and an object in motion will stay in motion at a constant velocity, unless acted upon by an unbalanced force.

- Inertia: The tendency of an object to resist changes in its state of motion. More massive objects have more inertia.
- Possible activities can include completing a tablecloth trick. This activity demonstrates inertia by quickly pulling a tablecloth from under a set of lightweight dishes. Materials include smooth tablecloth, lightweight dishes (plastic or unbreakable), and a table. Place the dishes on the tablecloth on a smooth table, quickly pull the tablecloth straight out from under the dishes, and finally observe how the dishes remain in place due to inertia.
- Another activity could be a completing a coin and card trick. This activity show inertia by flicking a card out from under a coin. Materials include index card, coin, and glass or cup. Place the card on top of the glass with a coin on top of the card. Quickly flick the card horizontally and observe how the coin fall straight into the glass due to inertia.

Concepts within Unit #2 **Link to MS Science TEKS**	**Success Criteria for this concept** *Students will…*
Concept #1: Linear Motion 7.7A, 7.7B, and 7.7C	• Know and use the formula used to calculate average speed • Plan and conduct investigations to collect accurate distance and time data. • Analyze collected data to calculate average speed using appropriate mathematical formulas. • Identifying patterns in the relationship between distance, time, and speed data. • Apply understanding of average speed calculations to design solutions to engineering challenges related to motion and speed.
Concept #2: Newton's First Law of Motion 7.7D	• Explain Newton's First Law of Motion. • Classify states of motion as rest, uniform motion, or acceleration based on the presence or absence of balanced and unbalanced forces. • Use Newton's First Law to predict the motion of an object when balanced or unbalanced forces are applied. • Provide explanations for observed changes in the state of motion of objects by analyzing the balanced or unbalanced forces acting upon them. • Apply knowledge of Newton's First Law to real-world scenarios, such as car accidents, playground activities, or sports events, to analyze the effect of balanced and unbalanced forces on the motion of objects. • Identify the components of a system involved in analyzing the effect of forces on the motion of objects, including the object itself, the forces acting upon it, and any external influences. • Recognize patterns in the motion of objects under the influence of balanced and unbalanced forces, such as changes in velocity over time or consistent acceleration due to unbalanced force.

Grading Period 2

Unit 2: Force and Motion (cont'd.)

Estimated Date Range: October 16 – October 31
Estimated Time Frame: 12 days

Unit Overview: (see above for Unit 2)

At home connections: (see above for Unit 2)

Unit 3: Energy Transformations

Estimated Date Range: November 4 – December 20
Estimated Time Frame: 29 days

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

At home connections:
Kinetic Energy

- Exploring kinetic energy at home can be an exciting and educational experience for Grade 7 science students.
- Kinetic energy is the energy an object possesses due to its motion.
- Energy can change between potential and kinetic energy based on the object's motion.
- Investigate ramps: test how the steepness of a ramp affects objects rolling down it.
- Build a rubber-band powered car: construct a rolling plastic water bottle powered by a rubber band.
- Design an experiment: use the process of experimental investigation to demonstrate the relationship between kinetic and potential energy. For example, students can collect observations about pullback cars, graph the averages, and use the data to draw conclusions.

Thermal Energy

- The following key concepts will be helpful for students and parents as the learning continues outside of the classroom.
    - **Thermal Energy**: The total kinetic energy of the particles in a substance.
    - **Temperature**: A measure of the average kinetic energy of the particles in a substance.
    - **Heat**: The transfer of thermal energy from a warmer object to a cooler one.
    - **Methods of Heat Transfer**:
        - **Conduction**: Heat transfer through direct contact.
        - **Convection**: Heat transfer through fluid (liquid or gas) movement.
        - **Radiation**: Heat transfer through electromagnetic waves.
- Possible activities and experiments can include:

1. Conduction Experiment: Spoon in Hot and Cold Water

Materials: Metal spoon, cup of hot water, cup of cold water
Procedure:

1. Place one end of the metal spoon in the cup of hot water and the other end in the cup of cold water.
2. After a few minutes, feel the spoon at both ends.
3. Discuss how heat from the hot water transfers to the cold water through the spoon, demonstrating conduction.

2. Convection Experiment: Colored Water in a Clear Container

Materials: Clear container, water, food coloring, heat source (e.g., hot plate)
Procedure:

1. Fill the clear container with water.
2. Add a few drops of food coloring.
3. Gently heat one side of the container.
4. Observe how the colored water moves, demonstrating convection currents as warm water rises and cool water sinks.

3. Radiation Experiment: Temperature and Color
Materials: Two thermometers, black and white paper, sunny spot
Procedure:

1. Wrap one thermometer in black paper and the other in white paper.
2. Place both thermometers in a sunny spot.
3. After 10-15 minutes, compare the temperatures on the thermometers.
4. Discuss how the black paper absorbs more heat through radiation than the white paper.

Concepts within Unit #3 **Link to MS Science TEKS**	**Success Criteria for this concept**
Concept #1: Kinetic Energy 7.8C	• Give examples of kinetic and potential energy. • Analyze situations where energy is transferred between kinetic energy and potential energy. • Create models that represent the relationship between kinetic energy and the motion of an object (energy and matter). • Design an investigation to explore the relationship between kinetic energy and the motion of an object. • Understand that kinetic energy is the cause of an object's motion. • Recognize that kinetic energy is associated with changes and transitions in the motion of objects. • Interpret data to draw conclusions about the role of kinetic energy in the motion of objects.
Concept #2: Thermal Energy 7.8A, 7.8B	• Identify that thermal energy is transferred from hotter objects to colder objects. • Describe how the characteristics of different types of materials such as thickness, heat conductivity, and reflectivity can be used to minimize or maximize thermal energy transfer by planning and carrying out investigations to construct explanations. • Use calculation tools and simulations to model and predict the behavior of thermal energy in various scenarios • Develop and use a model to demonstrate how thermal energy is transferred between objects. • Recognize that thermal energy is a form of energy associated with the motion of particles in a substance (energy and matter).

	• Investigate and describe how thermal energy is transferred through conduction, convection, and radiation transfers thermal energy. • Recognize that thermal energy is associated with changes in the state of temperature of a substance. • Plan and carry out investigations that measure and record temperature to describe the movement of thermal energy (energy and matter) . • Explain how thermal energy moves in a predictable pattern.

Grading Period 3

Unit 4: The Solar system

Estimated Date Range: January 9 – January 31
Estimated Time Frame: 16 days

Unit Overview:
This unit explores the diverse celestial bodies within our solar system, focusing on their physical properties, locations, and movements. Students will investigate the Sun as the center of our solar system, learning about its immense size, composition, and energy output. They'll then study the eight planets, examining their unique characteristics, atmospheres, and orbits around the Sun. The unit will cover moons, asteroids, comets, and meteors, discussing their compositions and behaviors. Students will also learn about the Kuiper Belt and Oort Cloud, understanding their roles in the outer reaches of our solar system. Throughout the unit, emphasis will be placed on how these various objects interact and move within the solar system, helping students develop a comprehensive understanding of our cosmic neighborhood. By the end of the unit, students should be able to describe and compare different celestial bodies, explain their locations and movements, and appreciate the complex dynamics of our solar system.

At home connections
Solar System Components

- Create a scale model of the solar system using household items. Use different sized fruits, sports balls, or other objects to represent the planets and Sun, placing them at proportional distances in your yard or neighborhood to visualize relative sizes and distances.
- Use online interactive tools and simulations to explore the solar system virtually. Websites like NASA's Solar System Exploration page offer detailed information and visualizations of planets, moons, and other celestial bodies.
- Observe the night sky together using a star chart or astronomy app. Identify visible planets, constellations, and track the Moon's phases over time. This helps reinforce understanding of celestial movements and locations.
- Build simple models of comets using dry ice and dirt to demonstrate their composition and behavior when approaching the Sun. (Ensure proper safety precautions are taken when handling dry ice).
- Visit a local planetarium or astronomy club event if available. These often offer guided tours of the night sky and opportunities to view celestial objects through telescopes.

Sun and Earth Relationship

- Create a simple sundial using a stick and a flat surface outdoors. Mark the shadow's position at different times of the day to demonstrate Earth's rotation and the apparent movement of the Sun across the sky.
- Use a globe and a flashlight to model how Earth's tilt causes seasons. Shine the light (representing the Sun) on the globe at different angles to show how sunlight intensity changes throughout the year.
- Track sunrise and sunset times over several weeks or months. Plot the data on a graph to visualize how daylight hours change with the seasons.
- Make a scale model of the Earth-Sun system using household objects. For example, use a peppercorn for Earth and a beach ball for the Sun, placing them about 24 meters apart to represent their relative sizes and distances.

Concepts within Unit #4 Link to MS Science TEKS	Success Criteria for this Concept
Concept #1: Solar System Components 7.9A	• Explain the Sun's physical properties, including its composition and energy production through nuclear fusion. • Develop a model of the Sun that illustrates its internal structure and energy output. • Recognize patterns in solar activity, such as sunspots and solar flares. • Describe the physical properties of terrestrial and gas giant planets, including composition and atmospheric conditions.

	• Create models that show the relative sizes and distances of planets from the Sun. • Identify patterns in the orbital paths and rotational periods of planets. • Analyze data from meteor observations to explain their behavior in Earth's atmosphere. • Construct models to illustrate the distribution of asteroids in the solar system
Concept #2: Sun and Earth Relationship 7.9B	• Understand the relative positions and motions of objects in the solar system, including the Sun, Earth, and other planets. • Analyze data to explain patterns of sunlight intensity, temperature variations, and seasonal changes on Earth, relating these to its orbit and axial tilt. • (*Patterns*) Identify and analyze patterns in the relationship between Earth's axial tilt, its orbit around the Sun, and seasonal changes in sunlight and temperature. • (*Cause and Effect*) Explain how the tilt of Earth's axis causes variations in the angle and intensity of sunlight, leading to seasonal changes and differences in daylight hours. • (*Systems and System Models*) Understand Earth as a system interacting with the Sun and other celestial bodies, with energy inputs and outputs affecting weather, climate, and ecosystems.

Unit 5: The Earth

Estimated Date Range: February 3 – March 7
Estimated Time Frame: 22 days

Unit Overview:
This unit explores the compelling evidence that demonstrates how Earth has undergone significant changes throughout its history. Students will investigate three key areas that provide insight into Earth's dynamic past: fossil evidence, plate tectonics, and the principle of superposition. They will examine how fossils reveal the evolution of life and past environments, analyze how plate tectonics explains the movement of continents and formation of geological features, and understand how the layering of rocks in superposition helps determine relative ages of geological formations. Through hands-on activities, data analysis, and scientific argumentation, students will develop a comprehensive understanding of how these lines of evidence support the concept of Earth's continuous change over vast timescales. By the end of the unit, students should be able to describe and explain various forms of evidence that support Earth's geological and biological evolution, appreciating the interconnectedness of Earth's systems and their changes over time.

At home connections:
Earth's Changing Surface

- Create a fossil cast using household materials like plaster of Paris or clay. Press objects like shells, leaves, or small toys into the material to mimic how fossils form. Discuss how real fossils provide evidence of past life forms and environments.
- Use a world map or puzzle to demonstrate plate tectonics. Cut out the continents and show how they fit together, discussing how this supports the theory of continental drift and provides evidence for Earth's changes over time.

- Make a model of rock layers using different colored playdough or sand in a clear container. This can illustrate the principle of superposition and how rock layers form over time, providing a visual representation of Earth's history.
- Create a timeline of Earth's history using a long strip of paper, marking major events and changes. This helps visualize the vast timescales involved in geological processes and the evolution of life.

Plate Tectonics

- Earthquake Simulation: Stack books on a table and slowly pull the bottom book. The sudden slip and fall of the stack demonstrates how stress buildup and release causes earthquakes along fault lines.
- Mountain Building Activity: Use playdough or clay to show how tectonic plates colliding can push up mountain ranges. Slowly push two colors of playdough together and watch the material rise up.
- Volcanic Eruption Model: Create a simple volcano model using baking soda and vinegar. Discuss how plate movements can lead to magma rising and erupting at the surface.
- Hot Spot Demonstration: Move a paper plate with holes cut in it over a flashlight beam to show how tectonic plate movement over a stationary hot spot creates chains of volcanoes.

Hydrosphere

- Water Usage Diary: Keep a diary of daily water usage at home. Discuss how excessive water use can impact local groundwater levels and surface water bodies.
- Simple Water Filtration Experiment: Create a simple water filter using sand, gravel, and activated charcoal. Discuss how natural filtration occurs in aquifers and how pollution can affect groundwater quality.
- Erosion Demonstration: Use a tray of soil and a watering can to demonstrate erosion. Discuss how construction and deforestation increase erosion and sedimentation in water bodies.
- Track Seafood Consumption: For a week, have students record any seafood consumed in their household. Discuss where this food comes from and how fishing practices can impact ocean ecosystems.
- Virtual Beach Cleanup: Use online resources to participate in a virtual beach clean-up. Many organizations offer data on commonly found trash items. Analyze this data to understand human impacts on coastal areas.
- Ocean Documentary Viewing: Watch a documentary about ocean conservation as a family. Discuss the human impacts highlighted and potential solutions presented.

Concepts within Unit #5 **Link to MS Science TEKS**	**Success Criteria for this concept**
Concept #1: Earth's Changing Surface 7.10A	• Identify patterns in the fossil record and explain how they contribute to understanding Earth's history. • use models to demonstrate the formation and interpretation of fossil evidence. • Discuss the cause-and-effect relationships between plate tectonics and Earth's changing surface by exploring real-world examples of geological investigations related to plate tectonics. • Analyze data from rock layers to support claims about Earth's changes and explain how superposition is a part of the larger Earth system. • Use visual models to demonstrate the geological processes at play in the formation of specific landforms. • Consider the scale of geological time and the proportions of different elements in the evidence, recognizing their significance. (scale) • Generate questions about how specific geological events have shaped Earth over time. (asking questions) • Develop models to illustrate the processes of fossilization, plate tectonics, and superposition. • Construct explanations for how fossil evidence, plate tectonics, and superposition contribute to our understanding of Earth's changes.

Concept #2: Plate Tectonics 7.10B	• Explain how Earth's lithosphere is divided into plates that move slowly and interact, causing geological changes such as earthquakes, volcanic eruptions, and mountain building. • Explain how plate movements at convergent, divergent, and transform boundaries cause different geological features and events. • Develop models to illustrate how plate movements at divergent boundaries lead to the formation of new oceanic crust and ocean basins (e.g., mid-ocean ridges). • Analyze data on earthquake locations and intensities to infer plate boundary types and the relationship between seismic activity and plate movements.
Concept #3: Hydrosphere	• Understand the interconnected systems of water (hydrology) and land (geology) within a watershed. • Develop models to illustrate the movement of water through a watershed, including interactions with human activities (e.g., agriculture, urban development). • Analyze how human activities can disrupt the balance of natural systems within a watershed, leading to both beneficial (e.g., irrigation, water supply) and harmful (e.g., pollution, habitat loss) effects on water resources.

Grading Period 4

Unit 6: Interactions within Ecosystems

Estimated Date Range: March 17 – April 23

Estimated Time Frame: 25 days

Unit Overview:

This unit explores the complex interactions that occur within ecosystems, focusing on how living and non-living components are interconnected. Students will investigate the basic structure of ecosystems, including biotic and abiotic factors, and examine how energy flows through food webs and how matter is recycled. They will learn about different ecological roles such as producers, consumers, and decomposers, and study various types of relationships between organisms like predation, competition, and symbiosis. The unit will also cover concepts of population dynamics, community interactions, and ecological succession. Throughout the unit, students will develop skills in scientific inquiry, data collection and analysis, and ecosystem modeling. They will apply their knowledge to understand human impacts on ecosystems and explore issues related to environmental conservation and management. By the end of the unit, students should be able to describe and analyze the intricate web of interactions that maintain balance within ecosystems.

At home connections:

Trophic Levels

- Create and edible energy pyramid: Use different foods to represent trophic levels (e.g., crackers for producers, cheese for primary consumers, meat for secondary consumers). Make the layers progressively smaller to show energy loss. Discuss how energy decreases as you move up the pyramid.
- Energy transfer card game: Create cards representing organisms at different trophic levels. Play a game where "energy cards" are passed from lower to higher levels, with some cards being removed at each transfer to represent energy loss.
- Online ecosystem simulation: Use free online ecosystem simulations to manipulate populations and observe how changes affect energy flow through trophic levels.
- Energy transfer role-play: Assign family members roles as different organisms in a food chain. Use tokens to represent energy units and act out how energy is transferred and lost between trophic levels.

Sustained Ecosystems

- Compost bin experiment: Set up a small compost bin to demonstrate the recycling of nutrients. Observe how organic matter breaks down over time, discussing the role of decomposers in recycling nutrients back into the ecosystem.
- Energy pyramid model: Build a physical model of an energy pyramid using building blocks or cardboard. Use different sizes for each trophic level to show how available energy decreases in successive levels. Discuss why this happens and its implications for ecosystem stability.
- Nutrient cycle game: Create a board game or card game that illustrates the nitrogen or carbon cycle. Include different stations representing various parts of the cycle (atmosphere, plants, animals, soil) and have players move tokens to show how matter moves through the ecosystem.
- Water cycle model: Create a simple water cycle model using a clear plastic container, soil, and plants. Observe how water moves through the system and discuss its role in transporting nutrients within ecosystems.

Concepts within Unit # 6 **Link to MS Science TEKS**	**Success Criteria for this concept**
Concept #1: Trophic Levels 7.12A	• Create diagrams illustrating the flow of energy within trophic levels, including primary producers, primary consumers, secondary consumers, and decomposers. • Describe how energy is transferred from one trophic level to another, emphasizing the roles of consumption, digestion, and metabolism in energy transfer. • Describe how energy pyramids represent the distribution of energy among trophic levels in an ecosystem. • Analyze quantitative data related to energy flow in trophic levels and calculate energy transfer efficiencies between successive trophic levels. • Apply their understanding of energy flow and energy pyramids to analyze and interpret real-world examples of food webs and ecosystem dynamics.
Concept #2: Sustained Ecosystems 7.12B	• Identify and describe the fundamental processes that sustain ecosystems, including energy flow, nutrient cycling, and biotic interactions. • Explain the concept of energy flow within ecosystems, including the roles of producers, consumers, and decomposers in transferring and transforming energy through trophic levels. • Analyze food webs to identify primary producers, herbivores, carnivores, and decomposers, and explain energy pathways within ecosystems. • Understand the cycling of matter and nutrients within ecosystems, including carbon, nitrogen, phosphorus, and water cycles, and can explain the importance of these cycles for ecosystem sustainability. • Apply understanding of ecosystem processes to analyze real-world examples and evaluate the impacts of human activities on ecosystem sustainability.

Unit 7: Organisms

Estimated Date Range: April 14 – May 28
Estimated Time Frame: 24 days

Unit Overview:
The unit aims to introduce students to the diversity of life on Earth, focusing on the characteristics, classification, and interactions of organisms. Students will learn about taxonomy, the science of classifying organisms into hierarchical categories based on shared characteristics. They will explore the major taxonomic groups and understand how organisms are grouped into kingdoms, phyla, classes, orders, families, genera, and species. Students will explore the vast array of organisms found on Earth, ranging from microorganisms to plants and animals. They will learn about the importance of biodiversity for ecosystem health and human well-being. Students will investigate how organisms have adapted to their environments through natural selection and evolution. They will learn about structural, behavioral, and physiological adaptations that help organisms survive and reproduce in their habitats.

At home connections:

- Food and Digestion: Keep a food diary for a week and research how each type of food is digested. Students can map out the journey of a meal through the digestive system.
- Do it Yourself System Model: Use household items (e.g., a long tube for intestines, a balloon for the stomach) to create a simple model of the digestive system.
- Pulse and Heart Rate Experiment: Measure and record pulse rates before and after physical activities. Compare how different activities affect heart rate and discuss why these changes occur.
- Circulatory System Diagram: Draw a detailed diagram of the circulatory system, labeling major arteries, veins, and the heart. Use colored pencils to differentiate oxygenated and deoxygenated blood.
- Breathing Rate Activity: Measure and compare breathing rates at rest and after exercise. Discuss how the respiratory system responds to increased physical activity.
- Muscle Movements: Research and demonstrate different types of muscle movements (e.g., flexion, extension). Students can create a simple animation or video showing how muscles work together to move parts of the body.
- Reaction Time Test: Conduct a reaction time experiment using a ruler drop test. Have a partner drop a ruler and measure the time it takes to catch it. Discuss how the nervous system controls reflexes.

Concepts within Unit #7 **Link to MS Science TEKS**	**Success Criteria for this concept** *Students will…*
Concept #1: Body Systems 7.13A	• Identify and describe the major systems of the human body, including their structures and functions • Understand how the various systems of the human body work together to maintain homeostasis and support overall health and functioning. • Create models and diagrams to illustrate the structures and functions of each human body system, demonstrating their understanding of system organization and interdependence. • Apply the knowledge of human body systems to analyze real-world scenarios and explain how disruptions or diseases in one system can affect the functioning of other systems.
Concept #2: Biological Diversity	• Identify and describe different types of selective pressures, such as predation, competition, environmental changes, and human

	interventions, and explain how these pressures influence the traits of populations. • Provide clear and relevant examples of natural selection in various organisms • Create models, diagrams, or graphs illustrating how natural and artificial selection can lead to changes in the frequency of traits within a population over successive generations. • Analyze real-world scenarios and explain how natural and artificial selection have influenced the traits of populations, providing evidence to support their explanations
Concept #3: Taxonomy and Kingdoms	• Explain the purpose of taxonomy in categorizing and organizing organisms based on their similarities and differences. • Correctly identify and define the major taxonomic categories, including domain, kingdom, phylum, class, order, family, genus, and species. • Provide examples of organisms belonging to different taxonomic categories, demonstrating an understanding of how organisms are classified based on shared characteristics. • Use taxonomic keys to identify and classify organisms based on their morphological characteristics, demonstrating proficiency in using this tool for classification purposes.

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.