4th Grade TEKS — Practices & Themes

Scientific and Engineering Practices (4.1–4.4) | Recurring Themes and Concepts (4.5)

Read this side first. These practices and recurring themes are the "how" of science — in the 2024 TEKS they wrap around every content standard on the back. You don't teach them on their own; you teach them *through* the content.

4.1 Investigation & Reasoning

SCIENTIFIC AND ENGINEERING PRACTICES

The student asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

- **A** ask questions and define problems based on observations or information from text, phenomena, models, or investigations
- **B** use scientific practices to plan and conduct descriptive investigations and use engineering practices to design solutions to problems
- **C** demonstrate safe practices and the use of safety equipment during classroom and field investigations as outlined in Texas Education Agency-approved safety standards
- **D** use tools, including hand lenses; metric rulers; Celsius thermometers; calculators; laser pointers; mirrors; digital scales; balances; graduated cylinders; beakers; hot plates; meter sticks; magnets; notebooks; timing devices; sieves; materials for building circuits; materials to support observation of habitats of organisms such as terrariums, aquariums, and collecting nets; and materials to support digital data collection such as computers, tablets, and cameras, to observe, measure, test, and analyze information
- **E** collect observations and measurements as evidence
- **F** construct appropriate graphic organizers used to collect data, including tables, bar graphs, line graphs, tree maps, concept maps, Venn diagrams, flow charts or sequence maps, and input-output tables that show cause and effect
- **G** develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem

4.2 Analyzing & Interpreting Data

SCIENTIFIC AND ENGINEERING PRACTICES

The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

- **A** identify advantages and limitations of models such as their size, scale, properties, and materials
- **B** analyze data by identifying any significant features, patterns, or sources of error
- **C** use mathematical calculations to compare patterns and relationships
- **D** evaluate a design or object using criteria

4.3 Explanations & Communication

SCIENTIFIC AND ENGINEERING PRACTICES

The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

- **A** develop explanations and propose solutions supported by data and models
- **B** communicate explanations and solutions individually and collaboratively in a variety of settings and formats
- **C** listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion

4.4 Science, Society & STEM Careers

SCIENTIFIC AND ENGINEERING PRACTICES

The student knows the contributions of scientists and recognizes the importance of scientific research and innovation for society. The student is expected to:

- **A** explain how scientific discoveries and innovative solutions to problems impact science and society
- **B** 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

4.5 Connecting Big Ideas Across Science

RECURRING THEMES AND CONCEPTS

The student understands that recurring themes and concepts provide a framework for making connections across disciplines. The student is expected to:

- **A** identify and use patterns to explain scientific phenomena or to design solutions
- **B** identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems
- **C** use scale, proportion, and quantity to describe, compare, or model different systems
- **D** examine and model the parts of a system and their interdependence in the function of the system
- **E** investigate how energy flows and matter cycles through systems and how matter is conserved
- **F** explain the relationship between the structure and function of objects, organisms, and systems
- **G** explain how factors or conditions impact stability and change in objects, organisms, and systems

Verbatim from 19 TAC §112.6, Grade 4 Science · TEKS adopted 2021, implemented 2024–2025 · Texas Education Agency

4th Grade TEKS — What You Teach

BACK · CONTENT STANDARDS

Matter and Energy | Force, Motion, and Energy | Earth and Space | Organisms and Environments

4.6 Physical Properties & Mixtures

MATTER AND ENERGY

The student knows that matter has measurable physical properties that determine how matter is identified, classified, changed, and used. The student is expected to:

- **A** classify and describe matter using observable physical properties, including temperature, mass, magnetism, relative density (the ability to sink or float in water), and physical state (solid, liquid, gas)
- **B** investigate and compare a variety of mixtures, including solutions that are composed of liquids in liquids and solids in liquids
- **C** demonstrate that matter is conserved when mixtures such as soil and water or oil and water are formed

4.7 Forces: Contact & at a Distance

FORCE, MOTION, AND ENERGY

The student knows the nature of forces and the patterns of their interactions.

The student is expected to plan and conduct descriptive investigations to explore the patterns of forces such as gravity, friction, or magnetism in contact or at a distance on an object

4.8 Energy, Circuits & Conductors

FORCE, MOTION, AND ENERGY

The student knows that energy is everywhere and can be observed in cycles, patterns, and systems. The student is expected to:

- **A** investigate and identify the transfer of energy by objects in motion, waves in water, and sound
- **B** identify conductors and insulators of thermal and electrical energy
- **C** demonstrate and describe how electrical energy travels in a closed path that can produce light and thermal energy

4.9 Sun, Earth & Moon Patterns

EARTH AND SPACE

The student recognizes patterns among the Sun, Earth, and Moon system and their effects. The student is expected to:

- **A** collect and analyze data to identify sequences and predict patterns of change in seasons such as change in temperature and length of daylight
- **B** collect and analyze data to identify sequences and predict patterns of change in the observable appearance of the Moon from Earth

4.10 Water Cycle & Earth's Changes

EARTH AND SPACE

The student knows that there are processes on Earth that create patterns of change. The student is expected to:

- **A** describe and illustrate the continuous movement of water above and on the surface of Earth through the water cycle and explain the role of the Sun as a major source of energy in this process
- **B** model and describe slow changes to Earth's surface caused by weathering, erosion, and deposition from water, wind, and ice
- **C** differentiate between weather and climate

4.11 Natural Resources & Conservation

EARTH AND SPACE

The student understands how natural resources are important and can be managed. The student is expected to:

- **A** identify and explain advantages and disadvantages of using Earth's renewable and nonrenewable natural resources such as wind, water, sunlight, plants, animals, coal, oil, and natural gas
- **B** explain the critical role of energy resources to modern life and how conservation, disposal, and recycling of natural resources impact the environment
- **C** determine the physical properties of rocks that allow Earth's natural resources to be stored there

4.12 Food Webs, Matter & Fossils

ORGANISMS AND ENVIRONMENTS

The student describes patterns, cycles, systems, and relationships within environments. The student is expected to:

- **A** investigate and explain how most producers can make their own food using sunlight, water, and carbon dioxide through the cycling of matter
- **B** describe the cycling of matter and flow of energy through food webs, including the roles of the Sun, producers, consumers, and decomposers
- **C** identify and describe past environments based on fossil evidence, including common Texas fossils

4.13 Plant Structures & Inherited Traits

ORGANISMS AND ENVIRONMENTS

The student knows that organisms undergo similar life processes and have structures that function to help them survive within their environments. The student is expected to:

- **A** explore and explain how structures and functions of plants such as waxy leaves and deep roots enable them to survive in their environment
- **B** differentiate between inherited and acquired physical traits of organisms

Verbatim from 19 TAC §112.6, Grade 4 Science · TEKS adopted 2021, implemented 2024–2025 · Texas Education Agency

5th Grade TEKS — Practices & Themes

Scientific and Engineering Practices (5.1–5.4) | Recurring Themes and Concepts (5.5)

Read this side first. These practices and recurring themes are the "how" of science — in the 2024 TEKS they wrap around every content standard on the back. You don't teach them on their own; you teach them *through* the content.

5.1 Investigation & Reasoning

SCIENTIFIC AND ENGINEERING PRACTICES

The student asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

- **A** ask questions and define problems based on observations or information from text, phenomena, models, or investigations
- **B** use scientific practices to plan and conduct descriptive and simple experimental investigations and use engineering practices to design solutions to problems
- **C** demonstrate safe practices and the use of safety equipment during classroom and field investigations as outlined in Texas Education Agency-approved safety standards
- **D** use tools, including calculators, microscopes, hand lenses, metric rulers, Celsius thermometers, prisms, concave and convex lenses, laser pointers, mirrors, digital scales, balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, notebooks, timing devices, materials for building circuits, materials to support observations of habitats or organisms such as terrariums and aquariums, and materials to support digital data collection such as computers, tablets, and cameras to observe, measure, test, and analyze information
- **E** collect observations and measurements as evidence
- **F** construct appropriate graphic organizers used to collect data, including tables, bar graphs, line graphs, tree maps, concept maps, Venn diagrams, flow charts or sequence maps, and input-output tables that show cause and effect
- **G** develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem

5.2 Analyzing & Interpreting Data

SCIENTIFIC AND ENGINEERING PRACTICES

The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

- **A** identify advantages and limitations of models such as their size, scale, properties, and materials
- **B** analyze data by identifying any significant features, patterns, or sources of error
- **C** use mathematical calculations to compare patterns and relationships
- **D** evaluate experimental and engineering designs

5.3 Explanations & Communication

SCIENTIFIC AND ENGINEERING PRACTICES

The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

- **A** develop explanations and propose solutions supported by data and models
- **B** communicate explanations and solutions individually and collaboratively in a variety of settings and formats
- **C** listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion

5.4 Science, Society & STEM Careers

SCIENTIFIC AND ENGINEERING PRACTICES

The student knows the contributions of scientists and recognizes the importance of scientific research and innovation for society. The student is expected to:

- **A** explain how scientific discoveries and innovative solutions to problems impact science and society
- **B** 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

5.5 Connecting Big Ideas Across Science

RECURRING THEMES AND CONCEPTS

The student understands that recurring themes and concepts provide a framework for making connections across disciplines. The student is expected to:

- **A** identify and use patterns to explain scientific phenomena or to design solutions
- **B** identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems
- **C** use scale, proportion, and quantity to describe, compare, or model different systems
- **D** examine and model the parts of a system and their interdependence in the function of the system
- **E** investigate how energy flows and matter cycles through systems and how matter is conserved
- **F** explain the relationship between the structure and function of objects, organisms, and systems
- **G** explain how factors or conditions impact stability and change in objects, organisms, and systems

Verbatim from 19 TAC §112.7, Grade 5 Science · TEKS adopted 2021, implemented 2024–2025 · Texas Education Agency

5th Grade TEKS — What You Teach

Matter and Energy | Force, Motion, and Energy | Earth and Space | Organisms and Environments

5.6 Properties, Mixtures & Particles

MATTER AND ENERGY

The student knows that matter has measurable physical properties that determine how matter is identified, classified, changed, and used. The student is expected to:

- **A** compare and contrast matter based on measurable, testable, or observable physical properties, including mass, magnetism, relative density (sinking and floating using water as a reference point), physical state (solid, liquid, gas), volume, solubility in water, and the ability to conduct or insulate thermal energy and electric energy
- **B** demonstrate and explain that some mixtures maintain physical properties of their substances such as iron filings and sand or sand and water
- **C** compare the properties of substances before and after they are combined into a solution and demonstrate that matter is conserved in solutions
- **D** illustrate how matter is made up of particles that are too small to be seen such as air in a balloon

5.7 Forces & Motion

FORCE, MOTION, AND ENERGY

The student knows the nature of forces and the patterns of their interactions. The student is expected to:

- **A** investigate and explain how equal and unequal forces acting on an object cause patterns of motion and transfer of energy
- **B** design a simple experimental investigation that tests the effect of force on an object in a system such as a car on a ramp or a balloon rocket on a string

5.8 Energy, Circuits & Light

FORCE, MOTION, AND ENERGY

The student knows that energy is everywhere and can be observed in cycles, patterns, and systems. The student is expected to:

- **A** investigate and describe the transformation of energy in systems such as energy in a flashlight battery that changes from chemical energy to electrical energy to light energy
- **B** demonstrate that electrical energy in complete circuits can be transformed into motion, light, sound, or thermal energy and identify the requirements for a functioning electrical circuit
- **C** demonstrate and explain how light travels in a straight line and can be reflected, refracted, or absorbed

5.9 Earth's Rotation & Day/Night

EARTH AND SPACE

The student recognizes patterns among the Sun, Earth, and Moon system and their effects.

The student is expected to demonstrate that Earth rotates on its axis once approximately every 24 hours and explain how that causes the day/night cycle and the appearance of the Sun moving across the sky, resulting in changes in shadow positions and shapes

5.10 Water Cycle, Rocks & Landforms

EARTH AND SPACE

The student knows that there are recognizable patterns and processes on Earth. The student is expected to:

- **A** explain how the Sun and the ocean interact in the water cycle and affect weather
- **B** model and describe the processes that led to the formation of sedimentary rocks and fossil fuels
- **C** model and identify how changes to Earth's surface by wind, water, or ice result in the formation of landforms, including deltas, canyons, and sand dunes

5.11 Managing Natural Resources

EARTH AND SPACE

The student understands how natural resources are important and can be managed.

The student is expected to design and explain solutions such as conservation, recycling, or proper disposal to minimize environmental impact of the use of natural resources

5.12 Ecosystems & Food Webs

ORGANISMS AND ENVIRONMENTS

The student describes patterns, cycles, systems, and relationships within environments. The student is expected to:

- **A** observe and describe how a variety of organisms survive by interacting with biotic and abiotic factors in a healthy ecosystem
- **B** predict how changes in the ecosystem affect the cycling of matter and flow of energy in a food web
- **C** describe a healthy ecosystem and how human activities can be beneficial or harmful to an ecosystem

5.13 Structures & Behaviors for Survival

ORGANISMS AND ENVIRONMENTS

The student knows that organisms undergo similar life processes and have structures and behaviors that help them survive within their environments. The student is expected to:

- **A** analyze the structures and functions of different species to identify how organisms survive in the same environment
- **B** explain how instinctual behavioral traits such as turtle hatchlings returning to the sea and learned behavioral traits such as orcas hunting in packs increase chances of survival

Verbatim from 19 TAC §112.7, Grade 5 Science · TEKS adopted 2021, implemented 2024–2025 · Texas Education Agency

6th Grade TEKS — Practices & Themes

Scientific and Engineering Practices (6.1–6.4) | Recurring Themes and Concepts (6.5)

Read this side first. These practices and recurring themes are the "how" of science — in the 2024 TEKS they wrap around every content standard on the back. You don't teach them on their own; you teach them *through* the content. Standard 6.1 alone is meant to fill at least 40% of your instructional time.

6.1 Investigation & Reasoning

SCIENTIFIC AND ENGINEERING PRACTICES

The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

- **A** ask questions and define problems based on observations or information from text, phenomena, models, or investigations
- **B** use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems
- **C** use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards
- **D** 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
- **E** collect quantitative data using the International System of Units (SI) and qualitative data as evidence
- **F** construct appropriate tables, graphs, maps, and charts using repeated trials and means to organize data
- **G** develop and use models to represent phenomena, systems, processes, or solutions to engineering problems
- **H** distinguish between scientific hypotheses, theories, and laws

6.2 Analyzing & Interpreting Data

SCIENTIFIC AND ENGINEERING PRACTICES

The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

- **A** identify advantages and limitations of models such as their size, scale, properties, and materials
- **B** analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations
- **C** use mathematical calculations to assess quantitative relationships in data
- **D** evaluate experimental and engineering designs

6.3 Explanations & Communication

SCIENTIFIC AND ENGINEERING PRACTICES

The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

- **A** develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories
- **B** communicate explanations and solutions individually and collaboratively in a variety of settings and formats
- **C** engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence

6.4 Science, Society & STEM Careers

SCIENTIFIC AND ENGINEERING PRACTICES

The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

- **A** 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
- **B** make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used
- **C** 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

6.5 Connecting Big Ideas Across Science

RECURRING THEMES AND CONCEPTS

The student understands that recurring themes and concepts provide a framework for making connections across disciplines. The student is expected to:

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

Verbatim from 19 TAC §112.26, Grade 6 Science · TEKS adopted 2021, implemented 2024–2025 · Texas Education Agency

6th Grade TEKS — What You Teach

BACK · CONTENT STANDARDS

Matter and Energy | Force, Motion, and Energy | Earth and Space | Organisms and Environments

6.6 Atoms, Mixtures & the Periodic Table

MATTER AND ENERGY

The student knows that matter is made of atoms, can be classified according to its properties, and can undergo changes. The student is expected to:

- **A** compare solids, liquids, and gases in terms of their structure, shape, volume, and kinetic energy of atoms and molecules
- **B** investigate the physical properties of matter to distinguish between pure substances, homogeneous mixtures (solutions), and heterogeneous mixtures
- **C** identify elements on the periodic table as metals, nonmetals, metalloids, and rare Earth elements based on their physical properties and importance to modern life
- **D** compare the density of substances relative to various fluids
- **E** identify the formation of a new substance by using the evidence of a possible chemical change, including production of a gas, change in thermal energy, production of a precipitate, and color change

6.7 Forces & Newton's Third Law

FORCE, MOTION, AND ENERGY

The student knows the nature of forces and their role in systems that experience stability or change. The student is expected to:

- **A** identify and explain how forces act on objects, including gravity, friction, magnetism, applied forces, and normal forces, using real-world applications
- **B** calculate the net force on an object in a horizontal or vertical direction using diagrams and determine if the forces are balanced or unbalanced
- **C** identify simultaneous force pairs that are equal in magnitude and opposite in direction that result from the interactions between objects using Newton's Third Law of Motion

6.8 Energy Transfer & Waves

FORCE, MOTION, AND ENERGY

The student knows that the total energy in systems is conserved through energy transfers and transformations. The student is expected to:

- **A** compare and contrast gravitational, elastic, and chemical potential energies with kinetic energy
- **B** describe how energy is conserved through transfers and transformations in systems such as electrical circuits, food webs, amusement park rides, or photosynthesis
- **C** explain how energy is transferred through transverse and longitudinal waves

6.9 Sun–Earth–Moon: Seasons & Tides

EARTH AND SPACE

The student models the cyclical movements of the Sun, Earth, and Moon and describes their effects. The student is expected to:

- **A** model and illustrate how the tilted Earth revolves around the Sun, causing changes in seasons
- **B** describe and predict how the positions of the Earth, Sun, and Moon cause daily, spring, and neap cycles of ocean tides due to gravitational forces

6.10 Earth's Layers & the Rock Cycle

EARTH AND SPACE

The student understands the rock cycle and the structure of Earth. The student is expected to:

- **A** differentiate between the biosphere, hydrosphere, atmosphere, and geosphere and identify components of each system
- **B** model and describe the layers of Earth, including the inner core, outer core, mantle, and crust
- **C** describe how metamorphic, igneous, and sedimentary rocks form and change through geologic processes in the rock cycle

6.11 Resource Management

EARTH AND SPACE

The student understands how resources are managed. The student is expected to:

- **A** research and describe why resource management is important in reducing global energy poverty, malnutrition, and air and water pollution
- **B** explain how conservation, increased efficiency, and technology can help manage air, water, soil, and energy resources

6.12 Ecosystems & Interdependence

ORGANISMS AND ENVIRONMENTS

The student knows that interdependence occurs between living systems and the environment. The student is expected to:

- **A** investigate how organisms and populations in an ecosystem depend on and may compete for biotic factors such as food and abiotic factors such as availability of light and water, range of temperatures, or soil composition
- **B** describe and give examples of predatory, competitive, and symbiotic relationships between organisms, including mutualism, parasitism, and commensalism
- **C** describe the hierarchical organization of organism, population, and community within an ecosystem

6.13 Cell Theory & Variation

ORGANISMS AND ENVIRONMENTS

The student knows that organisms have an organizational structure and variations can influence survival of populations. The student is expected to:

- **A** describe the historical development of cell theory and explain how organisms are composed of one or more cells, which come from pre-existing cells and are the basic unit of structure and function
- **B** identify and compare the basic characteristics of organisms, including prokaryotic and eukaryotic, unicellular and multicellular, and autotrophic and heterotrophic
- **C** describe how variations within a population can be an advantage or disadvantage to the survival of a population as environments change

Verbatim from 19 TAC §112.26, Grade 6 Science · TEKS adopted 2021, implemented 2024–2025 · Texas Education Agency

7th Grade TEKS — Practices & Themes

Scientific and Engineering Practices (7.1–7.4) | Recurring Themes and Concepts (7.5)

Read this side first. These practices and recurring themes are the "how" of science — in the 2024 TEKS they wrap around every content standard on the back. You don't teach them on their own; you teach them *through* the content. Standard 7.1 alone is meant to fill at least 40% of your instructional time.

7.1 Investigation & Reasoning

SCIENTIFIC AND ENGINEERING PRACTICES

The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

- **A** ask questions and define problems based on observations or information from text, phenomena, models, or investigations
- **B** use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems
- **C** use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards
- **D** 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
- **E** collect quantitative data using the International System of Units (SI) and qualitative data as evidence
- **F** construct appropriate tables, graphs, maps, and charts using repeated trials and means to organize data
- **G** develop and use models to represent phenomena, systems, processes, or solutions to engineering problems
- **H** distinguish between scientific hypotheses, theories, and laws

7.2 Analyzing & Interpreting Data

SCIENTIFIC AND ENGINEERING PRACTICES

The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

- **A** identify advantages and limitations of models such as their size, scale, properties, and materials
- **B** analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations
- **C** use mathematical calculations to assess quantitative relationships in data
- **D** evaluate experimental and engineering designs

7.3 Explanations & Communication

SCIENTIFIC AND ENGINEERING PRACTICES

The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

- **A** develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories
- **B** communicate explanations and solutions individually and collaboratively in a variety of settings and formats
- **C** engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence

7.4 Science, Society & STEM Careers

SCIENTIFIC AND ENGINEERING PRACTICES

The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

- **A** 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
- **B** make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used
- **C** 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

7.5 Connecting Big Ideas Across Science

RECURRING THEMES AND CONCEPTS

The student understands that recurring themes and concepts provide a framework for making connections across disciplines. The student is expected to:

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

Verbatim from 19 TAC §112.27, Grade 7 Science · TEKS adopted 2021, implemented 2024–2025 · Texas Education Agency

7th Grade TEKS — What You Teach

Matter and Energy | Force, Motion, and Energy | Earth and Space | Organisms and Environments

7.6 Elements, Compounds & Solutions

MATTER AND ENERGY

The student distinguishes between elements and compounds, classifies changes in matter, and understands the properties of solutions. The student is expected to:

- **A** compare and contrast elements and compounds in terms of atoms and molecules, chemical symbols, and chemical formulas
- **B** use the periodic table to identify the atoms and the number of each kind within a chemical formula
- **C** distinguish between physical and chemical changes in matter
- **D** describe aqueous solutions in terms of solute and solvent, concentration, and dilution
- **E** investigate and model how temperature, surface area, and agitation affect the rate of dissolution of solid solutes in aqueous solutions

7.7 Speed, Velocity & Newton's First Law

FORCE, MOTION, AND ENERGY

The student describes the cause-and-effect relationship between force and motion. The student is expected to:

- **A** calculate average speed using distance and time measurements from investigations
- **B** distinguish between speed and velocity in linear motion in terms of distance, displacement, and direction
- **C** measure, record, and interpret an object's motion using distance-time graphs
- **D** analyze the effect of balanced and unbalanced forces on the state of motion of an object using Newton's First Law of Motion

7.8 Thermal Energy & Heat Transfer

FORCE, MOTION, AND ENERGY

The student understands the behavior of thermal energy as it flows into and out of systems. The student is expected to:

- **A** investigate methods of thermal energy transfer into and out of systems, including conduction, convection, and radiation
- **B** investigate how thermal energy moves in a predictable pattern from warmer to cooler until all substances within the system reach thermal equilibrium
- **C** explain the relationship between temperature and the kinetic energy of the particles within a substance

7.9 Our Solar System & Gravity

EARTH AND SPACE

The student understands the patterns of movement, organization, and characteristics of components of our solar system. The student is expected to:

- **A** describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, comets, Kuiper belt, and Oort cloud
- **B** describe how gravity governs motion within Earth's solar system
- **C** analyze the characteristics of Earth that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere

7.10 Plate Tectonics & Earth's History

EARTH AND SPACE

The student understands the causes and effects of plate tectonics. The student is expected to:

- **A** describe the evidence that supports that Earth has changed over time, including fossil evidence, plate tectonics, and superposition
- **B** describe how plate tectonics causes ocean basin formation, earthquakes, mountain building, and volcanic eruptions, including supervolcanoes and hot spots

7.11 Humans & the Hydrosphere

EARTH AND SPACE

The student understands how human activity can impact the hydrosphere. The student is expected to:

- **A** analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed
- **B** describe human dependence and influence on ocean systems and explain how human activities impact these systems

7.12 Energy Flow & Matter Cycling

ORGANISMS AND ENVIRONMENTS

The student understands that ecosystems are dependent upon the cycling of matter and the flow of energy. The student is expected to:

- **A** diagram the flow of energy within trophic levels and describe how the available energy decreases in successive trophic levels in energy pyramids
- **B** describe how ecosystems are sustained by the continuous flow of energy and the recycling of matter and nutrients within the biosphere

7.13 Body Systems, Cells & Heredity

ORGANISMS AND ENVIRONMENTS

The student knows how systems are organized and function to support the health of an organism and how traits are inherited. The student is expected to:

- **A** identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems
- **B** describe the hierarchical organization of cells, tissues, organs, and organ systems within plants and animals
- **C** compare the results of asexual and sexual reproduction of plants and animals in relation to the diversity of offspring and the changes in the population over time
- **D** describe and give examples of how natural and artificial selection change the occurrence of traits in a population over generations

7.14 Taxonomy & Kingdoms

ORGANISMS AND ENVIRONMENTS

The student knows how the taxonomic system is used to describe relationships between organisms. The student is expected to:

- **A** describe the taxonomic system that categorizes organisms based on similarities and differences shared among groups
- **B** describe the characteristics of the recognized kingdoms and their importance in ecosystems such as bacteria aiding digestion or fungi decomposing organic matter

Verbatim from 19 TAC §112.27, Grade 7 Science · TEKS adopted 2021, implemented 2024–2025 · Texas Education Agency

8th Grade TEKS — Practices & Themes

Scientific and Engineering Practices (8.1–8.4) | Recurring Themes and Concepts (8.5)

Read this side first. These practices and recurring themes are the "how" of science — in the 2024 TEKS they wrap around every content standard on the back. You don't teach them on their own; you teach them *through* the content. Standard 8.1 alone is meant to fill at least 40% of your instructional time.

8.1 Investigation & Reasoning

SCIENTIFIC AND ENGINEERING PRACTICES

The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

- **A** ask questions and define problems based on observations or information from text, phenomena, models, or investigations
- **B** use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems
- **C** use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards
- **D** 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
- **E** collect quantitative data using the International System of Units (SI) and qualitative data as evidence
- **F** construct appropriate tables, graphs, maps, and charts using repeated trials and means to organize data
- **G** develop and use models to represent phenomena, systems, processes, or solutions to engineering problems
- **H** distinguish between scientific hypotheses, theories, and laws

8.2 Analyzing & Interpreting Data

SCIENTIFIC AND ENGINEERING PRACTICES

The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

- **A** identify advantages and limitations of models such as their size, scale, properties, and materials
- **B** analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations
- **C** use mathematical calculations to assess quantitative relationships in data
- **D** evaluate experimental and engineering designs

8.3 Explanations & Communication

SCIENTIFIC AND ENGINEERING PRACTICES

The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

- **A** develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories
- **B** communicate explanations and solutions individually and collaboratively in a variety of settings and formats
- **C** engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence

8.4 Science, Society & STEM Careers

SCIENTIFIC AND ENGINEERING PRACTICES

The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

- **A** 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
- **B** make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used
- **C** 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

8.5 Connecting Big Ideas Across Science

RECURRING THEMES AND CONCEPTS

The student understands that recurring themes and concepts provide a framework for making connections across disciplines. The student is expected to:

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

Verbatim from 19 TAC §112.28, Grade 8 Science · TEKS adopted 2021, implemented 2024–2025 · Texas Education Agency

8th Grade TEKS — What You Teach

Matter and Energy | Force, Motion, and Energy | Earth and Space | Organisms and Environments

8.6 Matter & Chemical Reactions

MATTER AND ENERGY

The student understands that matter can be classified according to its properties and matter is conserved in chemical changes that occur within closed systems. The student is expected to:

- **A** explain by modeling how matter is classified as elements, compounds, homogeneous mixtures, or heterogeneous mixtures
- **B** use the periodic table to identify the atoms involved in chemical reactions
- **C** describe the properties of cohesion, adhesion, and surface tension in water and relate to observable phenomena such as the formation of droplets, transport in plants, and insects walking on water
- **D** compare and contrast the properties of acids and bases, including pH relative to water
- **E** investigate how mass is conserved in chemical reactions and relate conservation of mass to the rearrangement of atoms using chemical equations, including photosynthesis

8.7 Force & Newton's Laws

FORCE, MOTION, AND ENERGY

The student understands the relationship between force and motion within systems. The student is expected to:

- **A** calculate and analyze how the acceleration of an object is dependent upon the net force acting on the object and the mass of the object using Newton's Second Law of Motion
- **B** investigate and describe how Newton's three laws of motion act simultaneously within systems such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches

8.8 Waves & the EM Spectrum

FORCE, MOTION, AND ENERGY

The student knows how energy is transferred through waves. The student is expected to:

- **A** compare the characteristics of amplitude, frequency, and wavelength in transverse waves, including the electromagnetic spectrum
- **B** explain the use of electromagnetic waves in applications such as radiation therapy, wireless technologies, fiber optics, microwaves, ultraviolet sterilization, astronomical observations, and X-rays

8.9 Stars, Galaxies & the Universe

EARTH AND SPACE

The student describes the characteristics of the universe and the relative scale of its components. The student is expected to:

- **A** describe the life cycle of stars and compare and classify stars using the Hertzsprung-Russell diagram
- **B** categorize galaxies as spiral, elliptical, and irregular and locate Earth's solar system within the Milky Way galaxy
- **C** research and analyze scientific data used as evidence to develop scientific theories that describe the origin of the universe

8.10 Weather & Climate Systems

EARTH AND SPACE

The student knows that interactions between Earth, ocean, and weather systems impact climate. The student is expected to:

- **A** describe how energy from the Sun, hydrosphere, and atmosphere interact and influence weather and climate
- **B** identify global patterns of atmospheric movement and how they influence local weather
- **C** describe the interactions between ocean currents and air masses that produce tropical cyclones, including typhoons and hurricanes

8.11 Climate Change & the Carbon Cycle

EARTH AND SPACE

The student knows that natural events and human activity can impact global climate. The student is expected to:

- **A** use scientific evidence to describe how natural events, including volcanic eruptions, meteor impacts, abrupt changes in ocean currents, and the release and absorption of greenhouse gases influence climate
- **B** use scientific evidence to describe how human activities, including the release of greenhouse gases, deforestation, and urbanization, can influence climate
- **C** describe the carbon cycle

8.12 Ecosystems & Stability

ORGANISMS AND ENVIRONMENTS

The student understands stability and change in populations and ecosystems. The student is expected to:

- **A** explain how disruptions such as population changes, natural disasters, and human intervention impact the transfer of energy in food webs in ecosystems
- **B** describe how primary and secondary ecological succession affect populations and species diversity after ecosystems are disrupted by natural events or human activity
- **C** describe how biodiversity contributes to the stability and sustainability of an ecosystem and the health of the organisms within the ecosystem

8.13 Cells, Genetics & Adaptation

ORGANISMS AND ENVIRONMENTS

The student knows how cell functions support the health of an organism and how adaptation and variation relate to survival. The student is expected to:

- **A** identify the function of the cell membrane, cell wall, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts, and vacuoles in plant or animal cells
- **B** describe the function of genes within chromosomes in determining inherited traits of offspring
- **C** describe how variations of traits within a population lead to structural, behavioral, and physiological adaptations that influence the likelihood of survival and reproductive success of a species over generations

Verbatim from 19 TAC §112.28, Grade 8 Science · TEKS adopted 2021, implemented 2024–2025 · Texas Education Agency