Texas Tutorials are designed specifically for the Texas Essential Knowledge and Skills (TEKS).

Science Tutorials offer targeted instruction, practice, and review designed to help students develop fluency, deepen conceptual understanding, and apply scientific thinking skills. Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By constantly honing their ability to explain and analyze biological scenarios, students build the depth of knowledge and higher-order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible through focused content, guided analysis, multi-modal representations, and personalized feedback as students reason through increasingly challenging problems. The Review It offers a high-impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

Unit 1: Nature of Science

- **WHAT IS SCIENCE?**
  - 8.1.A: 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. ask questions and define problems based on observations or information from text, phenomena, models, or investigations;
  - 8.4.A: Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content;
  - 8.1.H: 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. distinguish between scientific hypotheses, theories, and laws.
- **TYPES OF INVESTIGATIONS**
  - 8.1.D: 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. use appropriate tools such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators,

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hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, weather maps, hand lenses, and lab notebooks or journals;

- 8.1.E: 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. collect quantitative data using the International System of Units (SI) and qualitative data as evidence;
- 8.1.B: 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. use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;
- 8.2.D: 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. evaluate experimental and engineering designs.
- 8.1.A: 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. ask questions and define problems based on observations or information from text, phenomena, models, or investigations;

- **USING MODELS**
  - 8.2.A: 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. identify advantages and limitations of models such as their size, scale, properties, and materials;
  - 8.1.G: 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. develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and
  - 8.2.C: 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. use mathematical calculations to assess quantitative relationships in data; and
  - 8.5.C: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze how differences in scale, proportion, or quantity affect a system's structure or performance;

Unit 2: Measurement and Data

- **TOOLS AND MEASUREMENT**

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- 8.1.D: 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. use appropriate tools such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators, hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, weather maps, hand lenses, and lab notebooks or journals;
- 8.1.E: 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. collect quantitative data using the International System of Units (SI) and qualitative data as evidence;
- 8.2.C: 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. use mathematical calculations to assess quantitative relationships in data; and
- 8.1.D: 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. use appropriate tools such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators, hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, weather maps, hand lenses, and lab notebooks or journals;
- 8.1.E: 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. collect quantitative data using the International System of Units (SI) and qualitative data as evidence;

- **DISPLAYING AND INTERPRETING DATA**
  - 8.1.E: 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. collect quantitative data using the International System of Units (SI) and qualitative data as evidence;
  - 8.1.F: 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. construct appropriate tables, graphs, maps, and charts using repeated trials and means to organize data;

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- 8.2.B: 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. analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations;

Unit 3: Nature of Matter

- **WHAT IS MATTER?**
  - 8.6.A: 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. explain by modeling how matter is classified as elements, compounds, homogeneous mixtures, or heterogeneous mixtures;
- **MIXTURES OF MATTER**
  - 8.6.A: 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. explain by modeling how matter is classified as elements, compounds, homogeneous mixtures, or heterogeneous mixtures;
  - 8.1.B: 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. use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;
  - 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
  - 8.4.A: Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. 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;
- **CHEMICAL EQUATIONS**
  - 8.6.E: 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. investigate how mass is conserved in chemical reactions and relate conservation of mass to the rearrangement of atoms using chemical equations, including photosynthesis.
  - 8.6.B: 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. use the periodic table to identify the atoms involved in chemical reactions;
  - 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

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Unit 4: Force and Motion

- **WHAT IS MOTION?**
  - 8.5.B: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems;
  - 8.2.C: 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. use mathematical calculations to assess quantitative relationships in data; and
  - 8.7.A: Force, motion, and energy. The student understands the relationship between force and motion within systems. 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; and
- **EFFECTS OF FORCES**
  - 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
  - 8.5.B: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems;
  - 8.7.A: Force, motion, and energy. The student understands the relationship between force and motion within systems. 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; and
  - 8.2.C: 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. use mathematical calculations to assess quantitative relationships in data; and

Unit 5: Waves

- **ELECTROMAGNETIC WAVES**
  - 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
  - 8.8.A: Force, motion, and energy. The student knows how energy is transferred through waves. compare the characteristics of amplitude, frequency, and wavelength in transverse waves, including the electromagnetic spectrum; and
- **WAVES AND TECHNOLOGY**
  - 8.4.A: Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. relate the impact of past

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and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content;

- 8.8.B: Force, motion, and energy. The student knows how energy is transferred through waves. explain the use of electromagnetic waves in applications such as radiation therapy, wireless technologies, fiber optics, microwaves, ultraviolet sterilization, astronomical observations, and X-rays.
- 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

Unit 6: The Universe

- **THE UNIVERSE**
  - 8.5.C: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze how differences in scale, proportion, or quantity affect a system's structure or performance;
  - 8.2.A: 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. identify advantages and limitations of models such as their size, scale, properties, and materials;
  - 8.9.B: Earth and space. The student describes the characteristics of the universe and the relative scale of its components. categorize galaxies as spiral, elliptical, and irregular and locate Earths solar system within the Milky Way galaxy; and
  - 8.1.G: 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. develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and
  - 8.4.A: Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content;
  - 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
  - 8.9.C: Earth and space. The student describes the characteristics of the universe and the relative scale of its components. research and analyze scientific data used as evidence to develop scientific theories that describe the origin of the universe.
- **OUR SUN AND OTHER STARS**
  - 8.5.A: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and apply patterns to

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understand and connect scientific phenomena or to design solutions;

- 8.9.A: Earth and space. The student describes the characteristics of the universe and the relative scale of its components. describe the life cycle of stars and compare and classify stars using the Hertzsprung-Russell diagram;
- 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

Unit 7: Earth's Weather

- **THE ATMOSPHERE**
  - 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
  - 8.11.B: Earth and space. The student knows that natural events and human activity can impact global climate. use scientific evidence to describe how human activities, including the release of greenhouse gases, deforestation, and urbanization, can influence climate; and
  - 8.11.A: Earth and space. The student knows that natural events and human activity can impact global climate. 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;
  - 8.1.D: 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. use appropriate tools such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators, hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, weather maps, hand lenses, and lab notebooks or journals;
  - 8.1.G: 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. develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and
  - 8.5.B: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems;
  - 8.2.C: 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. use mathematical calculations to assess quantitative relationships in data; and

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- 8.10.B: Earth and space. The student knows that interactions between Earth, ocean, and weather systems impact climate. identify global patterns of atmospheric movement and how they influence local weather; and

- **WEATHER**
  - 8.5.B: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems;
  - 8.10.C: Earth and space. The student knows that interactions between Earth, ocean, and weather systems impact climate. describe the interactions between ocean currents and air masses that produce tropical cyclones, including typhoons and hurricanes.
  - 8.10.A: Earth and space. The student knows that interactions between Earth, ocean, and weather systems impact climate. describe how energy from the Sun, hydrosphere, and atmosphere interact and influence weather and climate;
  - 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
  - 8.10.B: Earth and space. The student knows that interactions between Earth, ocean, and weather systems impact climate. identify global patterns of atmospheric movement and how they influence local weather; and
  - 8.1.D: 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. use appropriate tools such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators, hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, weather maps, hand lenses, and lab notebooks or journals;
  - 8.5.G: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.
  - 8.5.A: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and apply patterns to understand and connect scientific phenomena or to design solutions;

- **SEVERE WEATHER**
  - 8.10.C: Earth and space. The student knows that interactions between Earth, ocean, and weather systems impact climate. describe the interactions between ocean currents and air masses that produce tropical cyclones, including typhoons and hurricanes.
  - 8.5.E: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze and explain how energy flows

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and matter cycles through systems and how energy and matter are conserved through a variety of systems;

- 8.10.B: Earth and space. The student knows that interactions between Earth, ocean, and weather systems impact climate. identify global patterns of atmospheric movement and how they influence local weather; and
- 8.1.D: 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. use appropriate tools such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators, hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, weather maps, hand lenses, and lab notebooks or journals;
- 8.1.G: 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. develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and
- 8.5.G: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.
- 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
- 8.2.D: 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. evaluate experimental and engineering designs.

Unit 8: Climate and Impact of Humans

- **CLIMATE**
  - 8.1.G: 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. develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and
  - 8.5.E: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze and explain how energy flows and matter cycles through systems and how energy and matter are conserved through a variety of systems;

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- 8.5.A: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and apply patterns to understand and connect scientific phenomena or to design solutions;
- 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
- 8.5.B: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems;
- 8.10.A: Earth and space. The student knows that interactions between Earth, ocean, and weather systems impact climate. describe how energy from the Sun, hydrosphere, and atmosphere interact and influence weather and climate;
- 8.5.G: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.
- 8.11.B: Earth and space. The student knows that natural events and human activity can impact global climate. use scientific evidence to describe how human activities, including the release of greenhouse gases, deforestation, and urbanization, can influence climate; and
- 8.11.A: Earth and space. The student knows that natural events and human activity can impact global climate. 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;

- **IMPACTS OF HUMANS**
  - 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
  - 8.5.B: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems;
  - 8.3.B: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and
  - 8.11.B: Earth and space. The student knows that natural events and human activity can impact global climate. use scientific evidence to describe how human activities, including the release of greenhouse gases, deforestation, and urbanization, can influence climate; and
  - 8.1.G: 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

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and models. develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and

- 8.2.D: 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. evaluate experimental and engineering designs.

Unit 9: Ecology

- **INTERACTIONS IN ECOSYSTEMS**
  - 8.1.G: 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. develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and
  - 8.12.A: Organisms and environments. The student understands stability and change in populations and ecosystems. explain how disruptions such as population changes, natural disasters, and human intervention impact the transfer of energy in food webs in ecosystems;
  - 8.5.D: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. examine and model the parts of a system and their interdependence in the function of the system;
  - 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
  - 8.5.E: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze and explain how energy flows and matter cycles through systems and how energy and matter are conserved through a variety of systems;
  - 8.11.C: Earth and space. The student knows that natural events and human activity can impact global climate. describe the carbon cycle.
- **SUCCESSION AND ECOSYSTEM STABILITY**
  - 8.1.G: 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. develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and
  - 8.5.G: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.
  - 8.12.A: Organisms and environments. The student understands stability and change in populations and ecosystems. explain how disruptions such as population changes, natural disasters, and human

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intervention impact the transfer of energy in food webs in ecosystems;

- 8.5.D: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. examine and model the parts of a system and their interdependence in the function of the system;
- 8.5.C: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze how differences in scale, proportion, or quantity affect a system's structure or performance;
- 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
- 8.12.B: Organisms and environments. The student understands stability and change in populations and ecosystems. describe how primary and secondary ecological succession affect populations and species diversity after ecosystems are disrupted by natural events or human activity; and
- 8.5.B: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems;
- 8.12.C: Organisms and environments. The student understands stability and change in populations and ecosystems. describe how biodiversity contributes to the stability and sustainability of an ecosystem and the health of the organisms within the ecosystem.

Unit 10: Cells

- **CHEMISTRY OF LIFE**
  - 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
  - 8.6.E: 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. investigate how mass is conserved in chemical reactions and relate conservation of mass to the rearrangement of atoms using chemical equations, including photosynthesis.
  - 8.13.A: Organisms and environments. The student knows how cell functions support the health of an organism and how adaptation and variation relate to survival. identify the function of the cell membrane, cell wall, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts, and vacuoles in plant or animal cells;
- **CELL STRUCTURE**
  - 8.1.D: 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. use appropriate tools such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators,

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hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, weather maps, hand lenses, and lab notebooks or journals;

- 8.4.A: Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content;
- 8.5.F: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze and explain the complementary relationship between the structure and function of objects, organisms, and systems; and
- 8.13.A: Organisms and environments. The student knows how cell functions support the health of an organism and how adaptation and variation relate to survival. identify the function of the cell membrane, cell wall, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts, and vacuoles in plant or animal cells;

Unit 11: Genetics

- **GENES AND DNA**
  - 8.13.B: Organisms and environments. The student knows how cell functions support the health of an organism and how adaptation and variation relate to survival. describe the function of genes within chromosomes in determining inherited traits of offspring; and
  - 8.5.F: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze and explain the complementary relationship between the structure and function of objects, organisms, and systems; and
  - 8.1.G: 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. develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and
  - 8.5.G: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.
  - 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
- **INHERITANCE**
  - 8.13.B: Organisms and environments. The student knows how cell functions support the health of an organism and how adaptation and variation relate to survival. describe the function of genes within chromosomes in determining inherited traits of offspring; and

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- 8.3.A: Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
- 8.4.A: Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content;
- 8.1.G: 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. develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and
- 8.5.B: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems;
- 8.5.A: Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. identify and apply patterns to understand and connect scientific phenomena or to design solutions;

- **NATURAL SELECTION**
  - 8.13.C: Organisms and environments. The student knows how cell functions support the health of an organism and how adaptation and variation relate to survival. 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.

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