

TASC Test Assessing Secondary Completion® Tutorials are based on specifications found in TASC Test information for publishers which includes alignment to Common Core State Standards and provide students a less stressful and more successful preparation effort as they work to achieve a TASC test passing score.

In each module, the Learn It and Try It make complex ideas accessible to students through focused content, guided analysis, and practice with personalized feedback so students are empowered to increase their Exam Readiness. The Review It offers an engaging and high impact video summary of key concepts and important to grasp connections. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers, linking a student's performance to ACT key idea details and score ranges. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are ready for test day and where they need to continue their review and practice.

This Tutorial is aligned to specifications found in TASC Test information for publishers for Mathematics, Science, Social Studies, Reading, and Writing test subject areas.

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Unit 1: Nature of Science

- **WHAT IS SCIENCE?**
- **TYPES OF INVESTIGATIONS**
- **USING MODELS**

Unit 2: Measurement and Data

- **TOOLS AND MEASUREMENT**
- **DISPLAYING AND INTERPRETING DATA**

Unit 3: Nature of Life

- **FROM ATOMS TO BIOSPHERE**
 - HS-LS1-2: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- **CHARACTERISTICS OF LIFE**
 - HS-LS1-2: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Unit 4: Cell Structure

• BIOMOLECULES

- HS-LS1-6: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

• PROKARYOTIC AND EUKARYOTIC CELLS

- HS-LS1-4: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Unit 5: Cellular Energetics

• CHEMISTRY OF LIFE

- HS-LS1-5: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

• PHOTOSYNTHESIS

- HS-LS1-5: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
- HS-LS2-5: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

• CELLULAR RESPIRATION

- HS-LS1-7: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.
- HS-LS2-3: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

Unit 6: Cell Growth and Reproduction

• THE CELL CYCLE

- HS-LS1-4: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

• MITOSIS

- HS-LS1-4: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Unit 7: DNA Structure and Function

• COMPONENTS OF DNA

- HS-LS1-1: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.

• THE GENETIC CODE

- HS-LS3-1: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

• DNA REPLICATION

- HS-LS1-1: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.
- HS-LS3-1: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Unit 8: Gene Expression

• TRANSCRIPTION

- HS-LS1-1: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.
- HS-LS3-1: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

• TRANSLATION

- HS-LS1-1: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.
- HS-LS1-6: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Construct and revise an explanation based on evidence for how carbon, hydrogen,

and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

- HS-LS3-1: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Unit 9: Mutations

• GENETIC CHANGES IN DNA

- HS-LS3-2: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
- HS-LS3-1: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
- HS-LS4-2: High Emphasis: Life Sciences Biological Evolution: Unity and Diversity Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

• GENETIC CHANGES IN CHROMOSOMES

- HS-LS3-1: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
- HS-LS4-2: High Emphasis: Life Sciences Biological Evolution: Unity and Diversity Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
- HS-LS3-2: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

Unit 10: Heredity

• MENDELIAN LAWS OF HEREDITY

- HS-LS3-3: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

- **MULTIPLE ALLELES AND ALLELES WITHOUT DOMINANCE**

- HS-LS3-3: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
- HS-LS4-3: High Emphasis: Life Sciences Biological Evolution: Unity and Diversity Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

Unit 11: Reproduction

- **MEIOSIS**

- HS-LS3-1: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

- **SEXUAL AND ASEXUAL REPRODUCTION**

- HS-LS3-1: High Emphasis: Life Sciences Heredity: Inheritance and Variation of Traits Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Unit 12: Evolution

- **MULTIPLE LINES OF EVIDENCE**

- HS-LS4-1: High Emphasis: Life Sciences Biological Evolution: Unity and Diversity Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
- HS-LS4-2: High Emphasis: Life Sciences Biological Evolution: Unity and Diversity Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

- **NATURAL SELECTION**

- HS-LS2-8: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Evaluate evidence for the role of group behavior on individual and species chances to survive and reproduce.
- HS-LS4-4: High Emphasis: Life Sciences Biological Evolution: Unity and Diversity Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

- **EVOLUTION OF SPECIES**

- HS-LS4-5: High Emphasis: Life Sciences Biological Evolution: Unity and Diversity Evaluate the evidence supporting claims that changes in environmental conditions may result in (1)

increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

Unit 13: Homeostasis

- **HOMEOSTASIS AND DYNAMIC EQUILIBRIUM**

- HS-LS1-3: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

- **FEEDBACK MECHANISMS IN ANIMALS**

- HS-LS1-2: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- HS-LS1-3: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Unit 14: Functions of Animal Systems

- **THE IMMUNE AND LYMPHATIC SYSTEMS**

- HS-LS1-2: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

- **THE NERVOUS SYSTEM**

- HS-LS1-2: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Unit 15: Functions of Plant Systems

- **PLANT TISSUES**

- HS-LS1-2: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

- **PLANT RESPONSES**

- HS-LS1-2: High Emphasis: Life Sciences From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Unit 16: Matter and Energy

- **FOOD CHAINS AND WEBS**

- HS-LS2-4: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

- **PYRAMIDS OF ENERGY, NUMBERS, AND BIOMASS**

- HS-LS2-4: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

Unit 17: Cycles in Nature

- **THE CARBON CYCLE**

- HS-LS2-3: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
- HS-LS2-4: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
- HS-LS2-5: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

- **THE NITROGEN AND PHOSPHORUS CYCLES**

- HS-LS2-4: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

Unit 18: Ecology of Succession

- **SUCCESSION IN COMMUNITIES**

- HS-LS2-2: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
- HS-LS2-1: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
- HS-LS2-6: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

- **SUCCESSION AND ECOSYSTEM STABILITY**

- HS-LS2-7: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

- **NATURAL IMPACTS ON ECOSYSTEMS**

- HS-LS2-1: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
- HS-LS2-2: High Emphasis: Life Sciences Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

Unit 19: Planet Earth and the Geosphere

• EARTH'S STRUCTURE AND CYCLES

- HS-ESS2-6: High Emphasis: Earth and Space Sciences Earths Systems Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
- HS-ESS2-1: High Emphasis: Earth and Space Sciences Earths Systems Develop a model to illustrate how Earths internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
- HS-ESS2-3: High Emphasis: Earth and Space Sciences Earths Systems Develop a model based on evidence of Earths interior to describe the cycling of matter by thermal convection.
- HS-ESS2-6: High Emphasis: Earth and Space Sciences Earths Systems Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

• THE ROCK CYCLE

- HS-ESS2-1: High Emphasis: Earth and Space Sciences Earths Systems Develop a model to illustrate how Earths internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

• SOIL

- HS-ESS2-1: High Emphasis: Earth and Space Sciences Earths Systems Develop a model to illustrate how Earths internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

Unit 20: The Atmosphere, Hydrosphere, and Cryosphere

• FRESHWATER AND ICE

- HS-ESS2-5: High Emphasis: Earth and Space Sciences Earths Systems Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

• OCEANS

- HS-ESS2-1: High Emphasis: Earth and Space Sciences Earths Systems Develop a model to illustrate how Earths internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

- HS-ESS2-5: High Emphasis: Earth and Space Sciences Earths Systems Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

- **THE ATMOSPHERE**

- HS-ESS2-4: High Emphasis: Earth and Space Sciences Earths Systems Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

Unit 21: Weather and Climate

- **WEATHER**

- HS-ESS2-5: High Emphasis: Earth and Space Sciences Earths Systems Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
- HS-ESS3-1: High Emphasis: Earth and Space Sciences Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

- **SEVERE WEATHER**

- HS-ESS2-5: High Emphasis: Earth and Space Sciences Earths Systems Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
- HS-ESS3-1: High Emphasis: Earth and Space Sciences Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

- **CLIMATE**

- HS-ESS2-4: High Emphasis: Earth and Space Sciences Earths Systems Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
- HS-ESS2-4: High Emphasis: Earth and Space Sciences Earths Systems Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
- HS-ESS3-1: High Emphasis: Earth and Space Sciences Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
- HS-ESS2-2: High Emphasis: Earth and Space Sciences Earths Systems Analyze geoscience data to make the claim that one change to Earths surface can create feedbacks that cause changes to other Earth systems.
- HS-ESS3-5: High Emphasis: Earth and Space Sciences Earth and Human Activity Analyze geoscience data and the results from global climate models to make an evidence-based

forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.

Unit 22: Humans and Earth's Resources

• NATURAL RESOURCES

- HS-ESS3-1: High Emphasis: Earth and Space Sciences Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
- HS-ESS3-4: High Emphasis: Earth and Space Sciences Earth and Human Activity Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
- HS-ESS3-2: High Emphasis: Earth and Space Sciences Earth and Human Activity Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
- HS-ESS3-3: High Emphasis: Earth and Space Sciences Earth and Human Activity Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.

• IMPACTS OF HUMANS

- HS-ESS2-6: High Emphasis: Earth and Space Sciences Earths Systems Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
- HS-ESS3-1: High Emphasis: Earth and Space Sciences Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
- HS-ESS3-6: High Emphasis: Earth and Space Sciences Earth and Human Activity Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
- HS-LS4-6: High Emphasis: Life Sciences Biological Evolution: Unity and Diversity Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
- HS-ESS3-4: High Emphasis: Earth and Space Sciences Earth and Human Activity Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
- HS-ESS3-2: High Emphasis: Earth and Space Sciences Earth and Human Activity Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
- HS-ESS3-3: High Emphasis: Earth and Space Sciences Earth and Human Activity Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.

Unit 23: Our Changing Planet

- **DEFORMING EARTH'S CRUST**

- HS-ESS2-1: High Emphasis: Earth and Space Sciences Earths Systems Develop a model to illustrate how Earths internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

- **WEATHERING AND EROSION**

- HS-ESS2-5: High Emphasis: Earth and Space Sciences Earths Systems Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
- HS-ESS2-1: High Emphasis: Earth and Space Sciences Earths Systems Develop a model to illustrate how Earths internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
- HS-ESS2-5: High Emphasis: Earth and Space Sciences Earths Systems Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
- HS-ESS3-1: High Emphasis: Earth and Space Sciences Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
- HS-ESS2-1: High Emphasis: Earth and Space Sciences Earths Systems Develop a model to illustrate how Earths internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
- HS-ESS2-2: High Emphasis: Earth and Space Sciences Earths Systems Analyze geoscience data to make the claim that one change to Earths surface can create feedbacks that cause changes to other Earth systems.

- **GEOLOGICAL TIME**

- HS-ESS1-6: High Emphasis: Earth and Space Sciences Earths Place in the Universe Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earths formation and early history.
- HS-ESS2-7: High Emphasis: Earth and Space Sciences Earths Systems Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.

Unit 24: Earth's Plates

- **PLATE TECTONICS**

- HS-ESS1-5: High Emphasis: Earth and Space Sciences Earths Place in the Universe Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.

- **EARTHQUAKES AND VOLCANOES**

- HS-ESS1-5: High Emphasis: Earth and Space Sciences Earths Place in the Universe Evaluate evidence of the past and current movements of continental and oceanic crust and the theory

of plate tectonics to explain the ages of crustal rocks.

Unit 25: The Solar System

• SUN-EARTH-MOON SYSTEM

- HS-ESS1-4: High Emphasis: Earth and Space Sciences Earths Place in the Universe Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

• OUR SOLAR SYSTEM

- HS-ESS1-4: High Emphasis: Earth and Space Sciences Earths Place in the Universe Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

Unit 26: Exploring the Universe

• THE UNIVERSE

- HS-ESS1-4: High Emphasis: Earth and Space Sciences Earths Place in the Universe Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
- HS-ESS1-2: High Emphasis: Earth and Space Sciences Earths Place in the Universe Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.

• OUR SUN AND OTHER STARS

- HS-ESS1-1: High Emphasis: Earth and Space Sciences Earths Place in the Universe Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the suns core to release energy that eventually reaches Earth in the form of radiation.
- HS-ESS1-1: High Emphasis: Earth and Space Sciences Earths Place in the Universe Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the suns core to release energy that eventually reaches Earth in the form of radiation.
- HS-ESS1-3: High Emphasis: Earth and Space Sciences Earths Place in the Universe Communicate scientific ideas about the way stars, over their life cycle, produce elements.

Unit 27: Nature of Matter

• WHAT IS MATTER?

- HS-PS1-3: Medium Emphasis: Physical Sciences Matter and Its Interactions Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

• ATOMIC STRUCTURE

- HS-PS1-3: Medium Emphasis: Physical Sciences Matter and Its Interactions Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

- **THE PERIODIC TABLE**

- HS-PS1-1: Medium Emphasis: Physical Sciences Matter and Its Interactions Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.
- HS-PS1-2: Medium Emphasis: Physical Sciences Matter and Its Interactions Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
- HS-PS1-3: Medium Emphasis: Physical Sciences Matter and Its Interactions Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

Unit 28: Changes in Matter: Part 1

- **MIXTURES OF MATTER**

- HS-PS1-5: Medium Emphasis: Physical Sciences Matter and Its Interactions Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

- **PHYSICAL AND CHEMICAL CHANGES**

- HS-PS1-5: Medium Emphasis: Physical Sciences Matter and Its Interactions Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
- HS-PS1-4: Medium Emphasis: Physical Sciences Matter and Its Interactions Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

Unit 29: Changes in Matter: Part 2

- **CHANGES OF STATE**

- HS-PS1-4: Medium Emphasis: Physical Sciences Matter and Its Interactions Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
- HS-PS1-5: Medium Emphasis: Physical Sciences Matter and Its Interactions Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
- HS-PS1-6: Medium Emphasis: Physical Sciences Matter and Its Interactions Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.

- **CHEMICAL EQUATIONS**

- HS-PS1-4: Medium Emphasis: Physical Sciences Matter and Its Interactions Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends

upon the changes in total bond energy.

- HS-PS1-7: Medium Emphasis: Physical Sciences Matter and Its Interactions Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

Unit 30: Force and Motion

• DESCRIBING FORCES

- HS-PS3-5: Medium Emphasis: Physical Sciences Energy Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.
- HS-PS2-5: Medium Emphasis: Physical Sciences Motion and Stability: Forces and Interactions Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.
- HS-PS2-4: Medium Emphasis: Physical Sciences Motion and Stability: Forces and Interactions Use mathematical representations of Newtons Law of Gravitation and Coulombs Law to describe and predict the gravitational and electrostatic forces between objects.

• DESCRIBING MOTION

- HS-PS2-1: Medium Emphasis: Physical Sciences Motion and Stability: Forces and Interactions Analyze data to support the claim that Newtons second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

• EFFECTS OF FORCES

- HS-PS2-1: Medium Emphasis: Physical Sciences Motion and Stability: Forces and Interactions Analyze data to support the claim that Newtons second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
- HS-PS2-2: Medium Emphasis: Physical Sciences Motion and Stability: Forces and Interactions Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.

Unit 31: Noncontact Forces

• ELECTROMAGNETIC FORCES

- HS-PS2-5: Medium Emphasis: Physical Sciences Motion and Stability: Forces and Interactions Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.
- HS-PS2-4: Medium Emphasis: Physical Sciences Motion and Stability: Forces and Interactions Use mathematical representations of Newtons Law of Gravitation and Coulombs Law to describe and predict the gravitational and electrostatic forces between objects.

- HS-PS2-6: Medium Emphasis: Physical Sciences Motion and Stability: Forces and Interactions Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.
- HS-PS3-5: Medium Emphasis: Physical Sciences Energy Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

- **GRAVITATIONAL FORCE**

- HS-PS2-4: Medium Emphasis: Physical Sciences Motion and Stability: Forces and Interactions Use mathematical representations of Newtons Law of Gravitation and Coulombs Law to describe and predict the gravitational and electrostatic forces between objects.
- HS-PS3-5: Medium Emphasis: Physical Sciences Energy Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

Unit 32: Energy

- **DESCRIBING ENERGY**

- HS-PS3-1: Medium Emphasis: Physical Sciences Energy Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
- HS-PS2-3: Medium Emphasis: Physical Sciences Motion and Stability: Forces and Interactions Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

- **ENERGY TRANSFER AND TRANSFORMATION**

- HS-PS3-1: Medium Emphasis: Physical Sciences Energy Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
- HS-PS3-3: Medium Emphasis: Physical Sciences Energy Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
- HS-PS1-8: Medium Emphasis: Physical Sciences Matter and Its Interactions Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
- HS-PS2-3: Medium Emphasis: Physical Sciences Motion and Stability: Forces and Interactions Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.
- HS-PS3-2: Medium Emphasis: Physical Sciences Energy Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative position of particles (objects).

- HS-PS3-5: Medium Emphasis: Physical Sciences Energy Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.
- HS-PS1-7: Medium Emphasis: Physical Sciences Matter and Its Interactions Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

Unit 33: Thermal Energy and Heat

• THERMAL ENERGY AND TEMPERATURE

- HS-PS3-4: Medium Emphasis: Physical Sciences Energy Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

• HEAT AND THERMAL ENERGY

- HS-PS3-4: Medium Emphasis: Physical Sciences Energy Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

• ENERGY TRANSFER AND TECHNOLOGY

- HS-PS3-4: Medium Emphasis: Physical Sciences Energy Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

Unit 34: Waves

• MECHANICAL WAVES

- HS-PS4-1: Medium Emphasis: Physical Sciences Waves and Their Applications in Technologies for Information Transfer Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

• ELECTROMAGNETIC WAVES

- HS-PS4-1: Medium Emphasis: Physical Sciences Waves and Their Applications in Technologies for Information Transfer Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Unit 35: Applications of Waves

• INTERACTIONS OF WAVES AND MATTER

- HS-PS4-4: Medium Emphasis: Physical Sciences Waves and Their Applications in Technologies for Information Transfer Evaluate the validity and reliability of claims in published materials of

the effects that different frequencies of electromagnetic radiation have when absorbed by matter.

- HS-PS4-5: Medium Emphasis: Physical Sciences Waves and Their Applications in Technologies for Information Transfer Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

- **WAVES AND TECHNOLOGY**

- HS-PS4-1: Medium Emphasis: Physical Sciences Waves and Their Applications in Technologies for Information Transfer Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
- HS-PS4-5: Medium Emphasis: Physical Sciences Waves and Their Applications in Technologies for Information Transfer Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.
- HS-PS4-2: Medium Emphasis: Physical Sciences Waves and Their Applications in Technologies for Information Transfer Evaluate questions about the advantages of using digital transmission and storage of information.