

Elementary Grade 5

Subject: Science OAS and EE Alignment



Physical Science – Matter and Its Interactions (PS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|---|
| 5.PS1.1 Develop a model to describe that matter is made of particles too small to be seen. | |
| 5.PS1.2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. | <p>EE.5-PS1-2</p> <p>Target Level: Measure and compare weights of substances before and after heating, cooling, or mixing substances to show that weight of matter is conserved.</p> <p>Precursor Level: Compare the weight of an object before and after it changes from a liquid to a solid and from a solid to a liquid.</p> <p>Initial Level: Recognize the change in state from liquid to solid or from solid to liquid of the same material.</p> |
| 5.PS1.3 Make observations and measurements to identify materials based on their properties. | <p>EE.5-PS1-3</p> <p>Target Level: Make observations and measurements to identify materials based on their properties (e.g., weight, shape, texture, buoyancy, color, or magnetism).</p> <p>Precursor Level: Classify materials by physical properties. (e.g., weight, shape, texture, buoyancy, color, or magnetism).</p> <p>Initial Level: Match materials with similar physical properties.</p> |
| 5.PS1.4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances. | |

Elementary Grade 5

Subject: Science OAS and EE Alignment



Physical Science – Motion and Stability: Forces and Interactions (PS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|---|
| <p>5.PS2.1 Support an argument, with evidence, that Earth's gravitational force pulls objects downward toward the center of the earth.</p> | <p>EE.5-PS2-1 Target Level: Demonstrate that the gravitational force exerted by Earth on objects is directed down. Precursor Level: Predict the direction an object will go when dropped. Initial Level: Recognize the direction an object will go when dropped.</p> |

Elementary Grade 5

Subject: Science OAS and EE Alignment



Physical Science – Energy (PS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|---|
| <p>5.PS3.1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the Sun.</p> | <p>EE.5-PS3-1 Target Level: Create a model to describe that energy in animals' food was once energy from the Sun.</p> <p>Precursor Level: Use models to describe that plants capture energy from sunlight.</p> <p>Initial Level: Identify simple models that show that plants need sunlight to grow.</p> |

Elementary Grade 5

Subject: Science OAS and EE Alignment



Life Science - From Molecules to Organisms: Structure and Processes (LS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|--|
| 5.LS1.1 Support an argument that plants get the materials they need for growth chiefly from air and water. | EE.5-LS1-1 Target Level: Provide evidence that plants need air and water to grow. Precursor Level: Provide evidence that plants grow. Initial Level: Distinguish things that grow from things that don't grow. |

Elementary Grade 5

Subject: Science OAS and EE Alignment



Life Science - Ecosystems: Interactions, Energy, and Dynamics (LS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|--|
| 5.LS2.1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. | EE.5-LS2-1 Target Level: Create a model that shows the movement of matter (e.g., plant growth, eating, composting) through living things. Precursor Level: Identify a model that shows the movement of matter from plants to animals (e.g. food chain/food web). Initial Level: Identify common human foods. |
| 5.LS2.2 Use models to explain factors that upset the stability to local ecosystems. | |

Elementary Grade 5

Subject: Science OAS and EE Alignment



Earth Science - Earth's Place in the Universe (ESS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|--|
| 5.ESS1.1 Support an argument with evidence that differences in the apparent brightness of the Sun compared to other stars is due to their relative distances from Earth. | |
| 5.ESS1.2 Represent data in graphical displays to reveal patterns of daily changes in the length and direction of shadows, in addition to different positions of the Sun, Moon, and stars at different times of the day, month, and year. | EE.5-ESS1-2 Target Level: Represent and interpret data on a picture, line, or bar graph to show seasonal patterns in the length of daylight hours. Precursor Level: Recognize patterns about length of daylight hours over time (e.g., week to week, month to month). Initial Level: Order events in daily routine including sunrise and sunset. |

Elementary Grade 5

Subject: Science OAS and EE Alignment



Earth Science - Earth's Systems (ESS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|--|
| 5.ESS2.1 Develop a model to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. | EE.5-ESS2-1 Target Level: Develop a model showing how water (hydrosphere) affects the living things (biosphere) found in a region. Precursor Level: Recognize how water (hydrosphere) affects people in a region (e.g., floods, droughts, mudslide, tourism, and recreation). Initial Level: Anticipates routine (e.g., clothes to wear, activities to do) to follow when it is raining. |
| 5.ESS2.2 Describe and graph amounts of saltwater and freshwater in various reservoirs to provide evidence about the distribution of water on Earth. | |

Elementary Grade 5

Subject: Science OAS and EE Alignment



Earth Science - Earth and Human Activity (ESS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| <p>5.ESS3.1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environments.</p> | <p>EE.5-ESS3-1 Target Level: Use information to describe how people can help protect the Earth's resources and how that affects the environment.</p> <p>Precursor Level: Compare two methods people can use to help protect the Earth's resources.</p> <p>Initial Level: Identify one way to protect a resource of Earth (e.g., put paper in the recycling bin).</p> |

Grade 6

Subject: Science OAS and EE Alignment



Physical Science - Matter and Its Interactions (PS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|------------------------|
| 6.PS1.4 Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. | |

Grade 6

Subject: Science OAS and EE Alignment



Physical Science - Energy (PS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|--|
| 6.PS3.3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. | <p>EE.MS-PS3-3</p> <p>Target Level: Test and refine a device (e.g., foam cup, insulated box, or thermos) to either minimize or maximize thermal energy transfer (e.g., keeping liquids hot or cold, preventing liquids from freezing, keeping hands warm in cold temperatures).</p> <p>Precursor Level: Investigate objects/materials, and predict their ability to maximize or minimize thermal energy transfer.</p> <p>Initial Level: Identify objects/materials used to minimize or maximize thermal energy transfer (e.g., gloves, vacuum flask, insulated hot pad holder or foam cup).</p> |
| 6.PS3.4 Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. | |

Grade 6

Subject: Science OAS and EE Alignment



Physical Science - Waves and Their Applications in Technologies for Information Transfer (PS4)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|--|
| 6.PS4.2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. | <p>EE.MS-PS4-2</p> <p>Target Level: Use a model to show how light waves (e.g., light through a water glass, light on colored objects) or sound waves are reflected, absorbed, or transmitted through various materials (e.g., water, air, table).</p> <p>Precursor Level: Investigate changes in vibrations and sources of sound in everyday life.</p> <p>Initial Level: Use a model to recognize that sound waves are transmitted by vibrations.</p> |

Grade 6

Subject: Science OAS and EE Alignment



Life Science - From Molecules to Organisms: Structure and Processes (LS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| 6.LS1.1 Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. | |
| 6.LS1.2 Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. | |
| 6.LS1.3 Use an argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. | EE.MS-LS1-3 Target Level: Make a claim about how a structure (e.g., organs and organ systems) and its related function supports survival of animals (circulatory, digestive, and respiratory systems). Precursor Level: Use a model to demonstrate how organs are connected in major organ systems. Initial Level: Recognize major organs of animals. |
| 6.LS1.8 Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. | |

Grade 6

Subject: Science OAS and EE Alignment



Earth Science - Earth's Place in the Universe (ESS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|------------------------|
| 6.ESS1.4 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's geologic history. | |

Grade 6

Subject: Science OAS and EE Alignment



Earth Science - Earth's Systems (ESS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|--|
| 6.ESS2.1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives these processes within and among Earth's systems. | EE.MS-ESS2-1 Target Level: Use a model to describe the change within the rock cycle between igneous, metamorphic, and sedimentary rock. Precursor Level: Use a model to describe the change from igneous to sedimentary rock. Initial Level: Identify the process that forms igneous rock (e.g., volcanoes). |
| 6.ESS2.2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. | EE.MS-ESS2-2 Target Level: Explain how geoscience processes that occur daily (e.g., wind, rain, runoff) slowly change the surface of Earth, while catastrophic events (e.g., earthquakes, tornadoes, floods) can quickly change the surface of Earth. Precursor Level: Identify geoscience processes (e.g., wind, rain, runoff) that have an impact on landforms (e.g., landslides, erosion such as gullies). Initial Level: Identify differences in weather conditions from day to day. |
| 6.ESS2.3 Analyze and interpret data on the patterns of distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. | |

Grade 6

Subject: Science OAS and EE Alignment



Earth Science - Earth's Systems (ESS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|--|
| 6.ESS2.4 Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. | |
| 6.ESS2.5 Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions. | |
| 6.ESS2.6 Develop and use a model to describe how unequal heating and rotation of the Earth causes patterns of atmospheric and oceanic circulation that determine regional climates. | <p>EE.MS-ESS2-6</p> <p>Target Level: Interpret basic weather information (e.g., radar, map) to make predictions about future conditions (e.g., precipitation, temperature, wind).</p> <p>Precursor Level: Interpret basic weather information (e.g., radar, map) to compare weather conditions (either over several days at the same location or different locations on the same day).</p> <p>Initial Level: Interpret basic weather information (e.g., radar, map) to identify weather conditions.</p> |

Grade 6

Subject: Science OAS and EE Alignment



Earth Science - Earth and Human Activity (ESS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|------------------------|
| 6.ESS3.2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. | |

Grade 7

Subject: Science OAS and EE Alignment



Physical Science - Matter and Its Interactions (PS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| 7.PS1.1 Develop models to describe the atomic composition of simple molecules and extended structures. | |
| 7.PS1.2 Analyze and interpret patterns of data related to the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. | <p>EE.MS-PS1-2</p> <p>Target Level: Interpret and analyze data on the properties (e.g., color, texture, odor, and state of matter) of substances before and after chemical changes have occurred (e.g., burning sugar or burning steel wool, rust, effervescent tablets).</p> <p>Precursor Level: Gather data on the properties (e.g., color, texture, odor, and state of matter) of substances before and after chemical changes have occurred (e.g., burning sugar or burning steel wool, rust, effervescent tablets).</p> <p>Initial Level: Observe and identify examples of change (e.g. state of matter, color, temperature, and odor).</p> |
| 7.PS1.3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. | |
| 7.PS1.5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. | |
| 7.PS1.6 Construct, test, and modify a device that releases or absorbs thermal energy by chemical processes to solve a problem. | |

Grade 7

Subject: Science OAS and EE Alignment



Physical Science - Matter and Its Interactions (PS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| 7.PS1.1 Develop models to describe the atomic composition of simple molecules and extended structures. | |
| 7.PS1.2 Analyze and interpret patterns of data related to the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. | <p>EE.MS-PS1-2</p> <p>Target Level: Interpret and analyze data on the properties (e.g., color, texture, odor, and state of matter) of substances before and after chemical changes have occurred (e.g., burning sugar or burning steel wool, rust, effervescent tablets).</p> <p>Precursor Level: Gather data on the properties (e.g., color, texture, odor, and state of matter) of substances before and after chemical changes have occurred (e.g., burning sugar or burning steel wool, rust, effervescent tablets).</p> <p>Initial Level: Observe and identify examples of change (e.g. state of matter, color, temperature, and odor).</p> |
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Grade 7

Subject: Science OAS and EE Alignment



Physical Science - Energy (PS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|------------------------|
| 7.PS3.1 Construct and interpret graphical displays of data to describe the proportional relationships of kinetic energy to the mass of an object and to the speed of an object. | |
| 7.PS3.2 Develop a model to describe that when objects interacting at a distance change their arrangement, different amounts of potential energy are stored in the system. | |
| 7.PS3.5 Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. | |

Grade 7

Subject: Science OAS and EE Alignment



Life Science - From Molecules to Organisms: Structure and Function (LS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|------------------------|
| 7.LS1.6 Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. | |
| 7.LS1.7 Develop a model to describe how food molecules in plants and animals are broken down and rearranged through chemical reactions to form new molecules that support growth and/or release energy as matter moves through an organism. | |

Grade 7

Subject: Science OAS and EE Alignment



Life Science - Ecosystems: Interactions, Energy, and Dynamics (LS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|---|
| 7.LS2.1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. | |
| 7.LS2.2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. | EE.MS-LS2-2 Target Level: Use models of food chains/webs to identify producers and consumers in aquatic and terrestrial ecosystems. Precursor Level: Classify animals based on what they eat (e.g., herbivore, omnivore, carnivore). Initial Level: Identify food that animals eat. |
| 7.LS2.3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. | |
| 7.LS2.4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. | |
| 7.LS2.5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services. | |

Grade 7

Subject: Science OAS and EE Alignment



Earth Science - Earth and Human Activity (ESS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| 7.ESS3.1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes. | EE.MS-ESS3-1 Target Level: Interpret, based on evidence, how the geoscience processes (e.g., weathering, erosion) create resources. Precursor Level: Identify the geoscience process that produces a natural resource (e.g., solar energy creating wind energy, rock cycle with ores and minerals). Initial Level: Identify a natural resource (e.g., water, sand, wind). |
| 7.ESS3.3 Apply scientific principles to design a method for monitoring and minimizing human impact on the environment. | EE.MS-ESS3-3 Target Level: Develop a plan to monitor and minimize a human impact on the local environment (e.g., water, land, pollution). Precursor Level: Recognize ways in which humans impact the environment (e.g., agriculture, pollution, recycling, city growth). Initial Level: Recognize resources (e.g., food, water, shelter, air) in the local environment that are important for human life. |
| 7.ESS3.4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems. | |
| 7.ESS3.5 Obtain, evaluate, and communicate evidence of the factors that have caused changes in global temperatures over the past century. | |

Grade 8

Subject: Science OAS and EE Alignment



Physical Science - Motion and Stability: Forces and Interactions (PS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|--|
| 8.PS2.1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects in a system. | |
| 8.PS2.2 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. | EE.MS-PS2-2 Target Level: Investigate and predict the change in motion of objects based on the forces acting on those objects. Precursor Level: Investigate and identify ways to change the motion of an object (e.g., change an incline's slope to make an object go slower, faster, farther). Initial Level: Identify ways to change the movement of an object (e.g., faster, slower, stop). |
| 8.PS2.3 Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. | |
| 8.PS2.4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. | |
| 8.PS2.5 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. | |

Grade 8

Subject: Science OAS and EE Alignment



Physical Science - Waves and Their Applications in Technologies for Information Transfer (PS4)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|------------------------|
| 8.PS4.1 Use mathematical representations to describe patterns in a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. | |
| 8.PS4.3 Integrate qualitative scientific and technical information to support the claim that digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. | |

Grade 8

Subject: Science OAS and EE Alignment



Life Science - From Molecules to Organisms: Structure and Processes (LS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|--|
| 8.LS1.4 Use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. | |
| 8.LS1.5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. | EE.MS-LS1-5 Target Level: Interpret data to show that environmental resources (e.g., food, light, space, water) influence growth of organisms (e.g., drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, fish growing larger in large ponds than small ponds). Precursor Level: Identify factors that influence growth of organisms. Initial Level: Match organisms to their habitats. |

Grade 8

Subject: Science OAS and EE Alignment



Life Science - Heredity: Inheritance and Variation of Traits (LS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|---|
| <p>8.LS3.1 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.</p> | |
| <p>8.LS3.2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.</p> | <p>EE.MS-LS3-2 Target Level: Make a claim supported by evidence that offspring inherit traits from their parents.</p> <p>Precursor Level: Identify similarities and differences between plant and animal parents and their offspring (e.g., eye color, hair/fur color, height, leaf shape, and/or markings).</p> <p>Initial Level: Recognize that organisms differ within same species (e.g., dogs, chickens, oaks that differ in color and size).</p> |

Grade 8

Subject: Science OAS and EE Alignment



Life Science - Biological Unity and Diversity (LS4)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|------------------------|
| 8.LS4.1 Analyze and interpret data to identify patterns within the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth. | |
| 8.LS4.2 Apply scientific ideas to construct an explanation for the patterns of anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer ancestral relationships. | |
| 8.LS4.3 Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. | |
| 8.LS4.4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. | |
| 8.LS4.5 Gather and synthesize information about the practices that have changed the way humans influence the inheritance of desired traits in organisms. | |
| 8.LS4.6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. | |

Grade 8

Subject: Science OAS and EE Alignment



Earth Science - Earth's Place in the Universe (ESS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| 8.ESS1.1 Develop and use a model of the Earth-Sun-Moon system to describe the cyclic patterns of lunar phases, eclipses of the Sun and Moon, and seasons. | EE.MS-ESS1-1 Target Level: Use an Earth-Sun-Moon model to show that Earth's orbit around the Sun corresponds to a calendar year and the orbit of the Moon around Earth corresponds to a month. Precursor Level: Use a model to show that Earth's Moon moves around Earth, and Earth and its Moon move around the Sun. Initial Level: Recognize models of the Earth, Moon, and Sun system. |
| 8.ESS1.2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. | |
| 8.ESS1.3 Analyze and interpret data to determine scale properties of objects in the solar system. | |

High School – Physical Science

Subject: Science OAS and EE Alignment



Physical Science - Matter and Its Interactions (PS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|--|
| PS.PS1.1 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. | |
| PS.PS1.2 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, knowledge of the patterns of chemical properties, and formation of compounds. | EE.HS-PS1-2 Target Level: Make a claim supported by evidence to explain patterns of chemical properties that occur in a substance during a common chemical reaction (e.g., baking soda and vinegar). Precursor Level: Identify the changes that have occurred during a chemical reaction (e.g., metal-rust, paper-burn). Initial Level: Recognize that a change has occurred during a chemical reaction. |
| PS.PS1.5 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. | |
| PS.PS1.7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. | |

High School – Physical Science

Subject: Science OAS and EE Alignment



Physical Science - Motion and Stability: Forces and Interactions (PS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| PS.PS2.1 Analyze and interpret data to support the claim of a causal relationship between the net force on an object and its change in motion, as described in Newton’s second law of motion. | |
| PS.PS2.2 Use mathematical representations to support the explanation that the total momentum of a system of objects is conserved when there is no net force on the system. | |
| PS.PS2.3 Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. | EE.HS-PS2-3 Target Level: Evaluate the effectiveness of safety devices and design a solution that could minimize the force of a collision. Precursor Level: Use data to compare the effectiveness of safety devices to determine which best minimizes the force of a collision. Initial Level: Identify safety equipment devices that minimize force of a collision (e.g., floor mats, helmets, or steel-toed boots). |
| PS.PS2.5 Plan and conduct an investigation to provide evidence that an electric current can cause a magnetic field and that a changing magnetic field can cause an electric current. | |

High School – Physical Science

Subject: Science OAS and EE Alignment



Physical Science - Energy (PS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|---|
| PS.PS3.1 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. | |
| PS.PS3.2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields. | |
| PS.PS3.3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. | |
| PS.PS3.4 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). | EE.HS-PS3-4 Target Level: Investigate and predict the temperatures of two liquids before and after combining to show uniform energy distribution. Precursor Level: Compare the temperatures of two liquids of different temperatures before and after combining. Initial Level: Compare relative difference in temperature (warmth, coldness) of two liquids. |

High School – Physical Science

Subject: Science OAS and EE Alignment



Physical Science - Waves and Their Applications in Technologies for Information Transfer (PS4)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|------------------------|
| PS.PS4.1 Use mathematical representations to explain both qualitative and quantitative relationships among frequency, wavelength, and speed of waves traveling in various media. | |
| PS.PS4.2 Evaluate questions about the advantages and disadvantages of using a digital transmission and storage of information. | |
| PS.PS4.4 Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. | |

High School – Chemistry

Subject: Science OAS and EE Alignment



| Oklahoma Academic Standards | DLM Essential Elements |
|---|------------------------|
| CH.PS1.1 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. | |
| CH.PS1.2 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, knowledge of the patterns of chemical properties, and formation of compounds. | |
| CH.PS1.3 Plan and conduct an investigation to compare the structure of substances at the bulk scale level to infer the strength of electrical forces between particles. | |
| CH.PS1.4 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. | |
| CH.PS1.5 Apply scientific principles and evidence to provide an explanation about the effects of changing the conditions of the reacting particles on the rate at which a reaction occurs. | |
| CH.PS1.6 Refine the design of a chemical system by specifying a change in conditions that would produce a change in the amounts of products at equilibrium. | |
| CH.PS1.7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. | |
| CH.PS1.8 Develop models to illustrate the changes in composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. | |

High School – Chemistry

Subject: Science OAS and EE Alignment



| Oklahoma Academic Standards | DLM Essential Elements |
|--|------------------------|
| CH.PS2.6 Communicate scientific and technical information about why the molecular level structure of designed materials determines how the material functions. | |

High School – Chemistry

Subject: Science OAS and EE Alignment



| Oklahoma Academic Standards | DLM Essential Elements |
|---|------------------------|
| CH.PS3.3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. | |
| CH.PS3.4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy between components in a closed system involves changes in energy dispersal and heat content and results in a more uniform energy distribution among the components in the system (second law of thermodynamics). | |

High School – Chemistry

Subject: Science OAS and EE Alignment



| Oklahoma Academic Standards | DLM Essential Elements |
|---|------------------------|
| CH.PS4.1 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. | |
| CH.PS4.3 Develop an argument for how scientific evidence supports the explanation that electromagnetic radiation can be described either by the wave model or the particle model, and in some situations one model is more useful than the other. | |

High School – Physics

Subject: Science OAS and EE Alignment



Physics - Matter and Its Interactions (PS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|------------------------|
| PH.PS1.8 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. | |

High School – Physics

Subject: Science OAS and EE Alignment



Physics - Motion and Stability: Forces and Interactions (PS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|------------------------|
| PH.PS2.1 Analyze and interpret data to support the claim that Newton’s second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. | |
| PH.PS2.2 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. | |
| PH.PS2.3 Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. | |
| PH.PS2.4 Use mathematical representations of Newton’s Law of Gravitation and Coulomb’s Law to describe and predict the gravitational and electrostatic forces between object. | |
| PH.PS2.5 Plan and conduct an investigation to provide evidence that an electric current can cause a magnetic field and that a changing magnetic field can cause an electric current. | |

High School – Physics

Subject: Science OAS and EE Alignment



Physics - Energy (PS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|------------------------|
| PH.PS3.1 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. | |
| PH.PS3.2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields. | |
| PH.PS3.3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. | |
| PH.PS3.4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy between components in a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). | |
| PH.PS3.5 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. | |

High School – Physics

Subject: Science OAS and EE Alignment



Physics - Waves and Their Applications in Technologies for Information Transfer (PS4)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| PH.PS4.1 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. | |
| PH.PS4.2 Evaluate questions about the advantages and disadvantages of using digital transmission and storage of information. | |
| PH.PS4.3 Develop an argument for how scientific evidence supports the explanation that electromagnetic radiation can be described either by the wave model or the particle model, and in some situations one model is more useful than the other. | |
| PH.PS4.4 Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. | |
| PH.PS4.5 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. | <p>EE.HS-PS4-5</p> <p>Target Level: Make a claim supported by evidence that shows how some devices use light and sound waves to transmit and capture information.</p> <p>Precursor Level: Identify common devices which use light or sound waves to transmit information.</p> <p>Initial Level: Identify how common technological devices are used for different purposes.</p> |

High School – Biology

Subject: Science OAS and EE Alignment



Biology - From Molecules to Organisms: Structures and Processes (LS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| B.LS1.1 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. | EE.HS-LS1-1 Target Level: Explain how different organs of the body carry out essential functions of life. Precursor Level: Indicate the function of major organs of the body. Initial Level: Identify major organs of the body. |
| B.LS1.2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. | EE.HS-LS1-2 Target Level: Use a model to illustrate the organization and interaction of major organs into systems (e.g., circulatory, respiratory, digestive, sensory) in the body to provide specific functions. Precursor Level: Identify which organs work for a specific function. Initial Level: Recognize that different organs have different functions. |
| B.LS1.3 Plan and conduct an investigation to provide evidence of the importance of maintaining homeostasis in living organisms. | EE.HS-LS1-3 Target Level: Collect data from an investigation to show how different organisms react to changes (e.g., heart rate increases with exercise, pupils react to light). Precursor Level: Compare before and after data on changes that occur to an organism. Initial Level: Identify changes in the data display (e.g. objects, pictures, graphs, charts, etc.). |

High School – Biology

Subject: Science OAS and EE Alignment



Biology - From Molecules to Organisms: Structures and Processes (LS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| B.LS1.4 Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. | EE.HS-LS1-4 Target Level: Use a model to illustrate how growth occurs when cells multiply. Precursor Level: Use a model to relate the number of cells to the size of a body. Initial Level: Recognize that organisms are composed of cells. |
| B.LS1.5 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. | |
| B.LS1.6 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. | |
| B.LS1.7 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. | |

High School – Biology

Subject: Science OAS and EE Alignment



Biology - Ecosystems: Interactions, Energy, and Dynamics (LS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| B.LS2.1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacities of ecosystems at different scales. | EE.HS-LS2-1 Target Level: Use a graphical representation to explain changes over time in the population size of an animal species (e.g., currently on the endangered list). Precursor Level: Use a graphical representation to show changes in population size. Initial Level: Recognize that there was a change in the population size. |
| B.LS2.2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. | EE.HS-LS2-2 Target Level: Use a graphical representation to explain the dependence of an animal population on other organisms for food and their environment for shelter. Precursor Level: Recognize the relationship between population size and available resources for food and shelter from a graphical representation. Initial Level: Identify food and shelter needs for familiar wildlife. |
| B.LS2.3 Construct and revise an explanation based on evidence for the cycling of matter and the flow of energy in aerobic and anaerobic conditions. | |
| B.LS2.4 Use a mathematical representation to support claims for the cycling of matter and the flow of energy among organisms in an ecosystem. | |

High School – Biology

Subject: Science OAS and EE Alignment



Biology - Ecosystems: Interactions, Energy, and Dynamics (LS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|------------------------|
| B.LS2.5 Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. | |
| B.LS2.6 Evaluate the 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. | |
| B.LS2.8 Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce. | |

High School – Biology

Subject: Science OAS and EE Alignment



Biology - Heredity: Inheritance and Variation of Traits (LS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|---|
| B.LS3.1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. | |
| B.LS3.2 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. | EE.HS-LS3-2 Target Level: Defend why reproduction may or may not result in offspring with different traits. Precursor Level: Make a claim supported by evidence that parents and offspring may have different traits. Initial Level: Compare traits of parents and offspring. |
| B.LS3.3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. | |

High School – Biology

Subject: Science OAS and EE Alignment



Biology - Biological Unity and Diversity (LS4)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| B.LS4.1 Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. | |
| B.LS4.2 Construct an explanation based on evidence that biological diversity is influenced by (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. | EE.HS-LS4-2 Target Level: Explain how the traits of particular species allow them to survive in their specific environments. Precursor Level: Identify factors in an environment that require special traits to survive. Initial Level: Match particular species to their various environments. |
| B.LS4.3 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. | EE.HS-LS4-3 Target Level: Interpret data sets to identify an advantageous heritable trait. Precursor Level: Using data sets, identify organisms that would survive better in certain environment. Initial Level: Recognize that some organisms survive better in certain environments. |

High School – Biology

Subject: Science OAS and EE Alignment



Biology - Biological Unity and Diversity (LS4)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|--|
| B.LS4.4 Construct an explanation based on evidence for how natural selection leads to adaptation of populations. | |
| B.LS4.5 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. | EE.HS-LS4-6 Target Level: Evaluate a strategy to protect a species. Precursor Level: Using a mathematical model, determine which human actions help or harm a species. Initial Level: Identify a human activity that has an effect on a species. |

High School – Earth and Space Science

Subject: Science OAS and EE Alignment



Earth and Space Science - Earth's Place in the Universe (ESS1)

| Oklahoma Academic Standards | DLM Essential Elements |
|---|---|
| ES.ESS1.1 Develop a model based on evidence to illustrate the life span of the Sun and the role of nuclear fusion in the Sun's core to convert matter to energy that eventually reaches Earth in the form of radiation. | |
| ES.ESS1.2 Construct an explanation of how the universe formed as a single point and continues to expand based on astronomical evidence of light spectra, motion of distant galaxies, and the composition of matter in the universe. | |
| ES.ESS1.3 Construct an explanation about the process that causes stars to produce elements throughout their life cycle. | |
| ES.ESS1.4 Use mathematical or computational representations to determine patterns that can be used to predict the motion of orbiting objects in the solar system. | EE.HS-ESS1-4 Target Level: Use a model of Earth and the Sun to show how Earth's tilt and orbit around the Sun cause changes in seasons. Precursor Level: Use a model of Earth and sun to show how Earth's positions in its orbit around the Sun correspond with the four seasons. Initial Level: Identify characteristics of the seasons. |
| ES.ESS1.5 Evaluate evidence in the patterns of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. | |
| ES.ESS1.6 Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of changes in Earth's formation and early history. | |

High School – Earth and Space Science

Subject: Science OAS and EE Alignment



Earth and Space Science - Earth Systems (ESS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|---|
| ES.ESS2.1 Develop a model to illustrate how Earth’s internal and surface processes operate at different scales of space and time to form continental and ocean-floor features. | EE.HS-ESS2-1 Target Level: Use a model to show how constructive forces (e.g., volcanoes) and destructive mechanisms (e.g., weathering, coastal erosions) change Earth's surface. Precursor Level: Recognize if processes that change Earth's surface are constructive or destructive. Initial Level: Recognize changes (e.g., mountain formation, erosion, and glacial changes) that occurred on Earth's surface. |
| ES.ESS2.2 Analyze geoscience data to make the claim that one change to Earth’s surface can create feedbacks and interactions that cause changes to other Earth’s systems. | |
| ES.ESS2.3 Develop a model based on evidence of Earth’s interior to describe the cycling of matter by thermal convection. | |
| ES.ESS2.4 Analyze and interpret data to explore how variations in the flow of energy into and out of Earth’s systems causes changes to the atmosphere and climate. | |
| ES.ESS2.5 Plan and conduct investigations of how the structure and resulting properties of water interact with the Earth’s materials and surface processes. | |
| ES.ESS2.6 Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. | |
| ES.ESS2.7 Engage in argument from evidence for how the simultaneous co-evolution of Earth’s systems and life on Earth led to periods of stability and change over geologic time. | |

High School – Earth and Space Science

Subject: Science OAS and EE Alignment



Earth and Space Science - Earth and Human Activities (ESS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|---|
| ES.ESS3.1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate affect human activity. | EE.HS-ESS3-1 Target Level: Construct an explanation based on evidence for how natural hazards have influenced human activity. Precursor Level: Recognize how natural hazards (e.g., floods, earthquakes, tornadoes) influence human activity. Initial Level: Recognize characteristics of natural hazards (e.g., floods, earthquakes, tornadoes). |
| ES.ESS3.2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost- benefit ratios on large and small scales. | EE.HS-ESS3-2 Target Level: Construct an argument for a strategy to conserve, recycle, or reuse resources. Precursor Level: Describe the factors that would favor one strategy to conserve, recycle, or reuse resources over another. Initial Level: Recognize strategies to manage objects (e.g., dispose, repurpose, or recycle) |
| ES.ESS3.5 Construct a scientific explanation from evidence for how geological processes cause uneven distribution of natural resources. | |

High School – Environmental Science

Subject: Science OAS and EE Alignment



Environmental Science - Ecosystems: Interactions, Energy, and Dynamics (LS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|------------------------|
| EN.LS2.1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacities of ecosystems at different scales. | |
| EN.LS2.2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. | |
| EN.LS2.4 Use a mathematical representation to support claims for the cycling of matter and the flow of energy among organisms in an ecosystem. | |
| EN.LS2.6 Evaluate the 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. | |
| EN.LS2.7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. | |

High School – Environmental Science

Subject: Science OAS and EE Alignment



Environmental Science - Earth Systems (ESS2)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|------------------------|
| EN.ESS2.1 Develop a model to illustrate how Earth’s internal and surface processes operate at different scales of space and time to form continental and ocean-floor features. | |
| EN.ESS2.2 Analyze geoscience data to make the claim that one change to Earth’s surface can create feedbacks and interactions that cause changes to other Earth systems. | |
| EN.ESS2.3 Develop a model based on evidence of Earth’s interior to describe the cycling of matter by thermal convection. | |
| EN.ESS2.4 Analyze and interpret data to explore how variations in the flow of energy into and out of Earth’s systems causes changes to the atmosphere and climate. | |
| EN.ESS2.5 Plan and conduct investigations of how the structure and resulting properties of water interact with the Earth’s materials and surface processes. | |
| EN.ESS2.6 Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. | |
| EN.ESS2.7 Engage in argument from evidence for how the simultaneous co-evolution of Earth’s systems and life on Earth led to periods of stability and change over geologic time. | |

High School – Environmental Science

Subject: Science OAS and EE Alignment



Environmental Science - Earth and Human Activities (ESS3)

| Oklahoma Academic Standards | DLM Essential Elements |
|--|--|
| EN.ESS3.1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate affect human activity. | |
| EN.ESS3.2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost- benefit ratios on large and small scales. | |
| EN.ESS3.3 Use computational simulations to illustrate changes between the relationships of natural resources, human populations, and biodiversity and their sustainability within Earth systems. | EE.HS-ESS3-3 Target Level: Analyze data to determine the effects of a conservation strategy on the level of a natural resource. Precursor Level: Organize data on the effects of conservation strategies (e.g., using less energy, using rechargeable batteries, recycling or repurposing materials). Initial Level: Gather data on the effects of a local (e.g., class or school-wide) conservation strategy. |
| EN.ESS3.4 Evaluate design solutions for a major global or local environmental problem that reduces or stabilizes the impacts of human activities on natural systems. | |