
Coal City Unit District #1
Sixth Grade
Science Curriculum

SC.6:1 **Students will investigate and demonstrate through text, visual representations, and mathematical models how energy, particularly potential and kinetic energy, is transferred and transformed. (NGSS MS-PS3-1; MS-PS3-2; MS-PS3-5; MS-PS3-1-3, MS-PS3-1-4, CCC-5.C)**

- SC.6:1-1 Define energy
- SC.6:1-2 Identify that a system of objects may contain potential energy, depending on their relative positions
- SC.6:1-3 Describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system (MS-PS3-2)
- SC.6:1-4 Describe that when the object's shape changes, different amounts of potential energy is stored in the system (MS-PS3-2)
- SC.6:1-5 Define kinetic energy as energy dealing with motion
- SC.6:1-6 Explain how the mass and speed of an object will affect the amount of kinetic energy
- SC.6:1-7 Interpret graphical data to determine how kinetic energy is linked to mass and speed (MS-PS3-1)
- SC.6:1-8 Generate arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object (MS-PS3-5)
- SC.6:1-9 Identify the different forms energy may take (mechanical, nuclear, thermal, chemical, and electrical)
- SC.6:1-10 Relate energy to motion and force
- SC.6:1-11 Apply the law of conservation of energy to transformations
- SC.6:1-12 Determine the relationships among energy, motion, force, and work
- SC.6:1-13 Describe how energy is transferred between objects

SC.6:2 Students will implement their understanding of the relationships and differences of thermal energy, temperature, and heat. (NGSS MS-PS3-3*; MS-PS3-4, MS-PS3-5; MS-PS3-A-1; PS3-B-3; CCC-5.C)

- SC.6:2-1 Define temperature as the average kinetic energy of the particles in an object
- SC.6:2-2 Define thermal energy as the total kinetic and potential energy of all the particles in an object
- SC.6:2-3 Define heat as the energy that is transferred from a warmer object to a cooler object
- SC.6:2-4 Give examples of objects that change temperatures at different rates (i.e. specific heat of materials)
- SC.6:2-5 Discuss what causes changes in temperatures within an object
- SC.6:2-6 Discuss ways to increase and decrease the transfer of thermal energy
- SC.6:2-7 Recognize that when energy is spontaneously transferred out of hotter regions or objects, it transfers to cooler regions or objects
- SC.6:2-8 Differentiate between the different forms of energy transfer: convection, conduction, and radiation
- SC.6:2-9 Recognize that energy changes cause expansion and contraction
- SC.6:2-10 Differentiate between thermal insulators and thermal conductors
- SC.6:2-11 Perform a test, which involves the design of a device that either minimizes or maximizes thermal energy transfer (MS-PS3-3*)

SC.6:3 **Students will investigate real-life situations related to concepts of force and motion and use information when faced with real-world situations that require applied force to cause motion or when studying more advanced concepts related to speed, acceleration, friction, or gravitational forces. (NGSS MS-PS2-1*; MS-PS2-2; MS-PS2-A-1, MS-PS2-A-2)**

- SC.6:3-1 Describe Newton's Laws of Motion
- SC.6:3-2 State an object is in motion if its position changes when compared to another object
- SC.6:3-3 Identify all matter as having mass
- SC.6:3-4 Use tools to measure mass (e.g. balance)
- SC.6:3-5 Define inertia (Newton's First Law)
- SC.6:3-6 Describe how mass affects an object's motion
- SC.6:3-7 Define force as a push or pull
- SC.6:3-8 Describe how forces cause an object to be put in motion
- SC.6:3-9 Predict the outcomes of collisions between different objects
- SC.6:3-10 Explain how when a force is applied to an object in a collision, an equal force is applied to the other object (Newton's Third Law)
- SC.6:3-11 Identify forces acting on an object or system
- SC.6:3-12 Develop 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 (MS-PS2-2)
- SC.6:3-13 Design solutions to problems involving the motion of two colliding objects (MS-PS2-1*)
- SC.6:3-14 Evaluate solutions to problems involving the motion of two colliding objects (MS-PS2-1*)
- SC.6:3-15 Apply understanding of Newton's Laws of Motion to real-life scenarios
- SC.6:3-16 Contrast constant speed and acceleration

SC.6:4 Students will demonstrate an understanding of electric forces and magnetic forces and the interactions between them. (NGSS MS-PS2-3; MS-PS2-5, MS-PS2-B-1, MS-PS2-B-3, MS-PS3-C-1)

- SC.6:4-1 Recognize that two objects can exert electric forces on each other even though they are not in contact
- SC.6:4-2 Describe evidence that electric force acting at a distance can be explained by fields that extend through space (MS-PS2-5)
- SC.6:4-3 Explain what causes magnetic forces
- SC.6:4-4 Identify that opposite forces attract when dealing with electromagnetic fields.
- SC.6:4-5 Explain how electricity relates to magnetism
- SC.6:4-6 Explain the properties of solenoids and electromagnets
- SC.6:4-7 Analyze data to determine how an increase in the number of coils or current affects magnetic field strength (MS-PS2-3)
- SC.6:4-8 Explain how current can be produced in a conductor
- SC.6:4-9 Describe how generators and transformers work
- SC.6:4-10 Explain how magnetic fields affect moving charges

SC.6:5 Students will apply knowledge of different wave types to their understanding of energy and matter, including how different wave characteristics and behaviors are important to Earth's systems. (NGSS PS-MS-PS4-2, MS-PS4-A-2, MS-PS4-B-2, MS-PS4-B-4)

- SC.6:5-1 Explain how different types of waves transmit energy in different ways
- SC.6:5-2 Identify common properties that influence the waves' behavior
- SC.6:5-3 Determine how frequency, wavelength, and speed are related
- SC.6:5-4 Explain the concept of diffraction
- SC.6:5-5 Explain the concept of refraction
- SC.6:5-6 Explain the concept of reflection
- SC.6:5-7 Explain how sound waves interact with matter by processes of reflection, absorption, transmittal, and diffraction
- SC.6:5-8 Describe how stiffness, density, and temperature of materials affect the speed of sound
- SC.6:5-9 Identify the characteristics of electromagnetic waves
- SC.6:5-10 Compare models of electromagnetic wave behavior
- SC.6:5-11 Identify the waves that make up the electromagnetic spectrum
- SC.6:5-12 Explain how models describe the way that frequency and amplitude are related in waves

SC.6:6	Students will investigate Earth, sun, and moon systems to explain real-world phenomena like eclipses, seasons, and tides. (MS-ESS1-1; MS-ESS1-2; MS-ESS1-3; MS-PS2-A-1, MS-PS2-A-2)
SC.6:6-1	Identify gravity as an attractive force and present between all objects with mass
SC.6:6-2	Compare the gravitational pull an object exerts on another object with a different mass or distances
SC.6:6-3	Describe how gravitational forces hold solar systems and galaxies together
SC.6:6-4	Identify the composition of the solar system, including the sun, moon, planets, and other celestial bodies. (MS-ESS1-3)
SC.6:6-5	Illustrate how the position of the sun, Earth, and moon form eclipses
SC.6:6-6	Illustrate how the tilt of the earth on its axis causes unequal sunlight and heating (seasons)
SC.6:6-7	Discuss the movement of the sun, Earth, moon, and planets
SC.6:6-8	Identify the phases of the moon.
SC.6:6-9	Develop a model of the earth-sun-moon system to describe the cyclic patterns of lunar phases (MS-ESS1-1)
SC.6:6-10	Identify the parts of solar eclipses, including the location of the sun, moon, earth, umbra, and penumbra
SC.6:6-11	Develop a model of the earth-sun-moon system to describe the cyclic patterns of eclipses of the sun and moon (MS-ESS1-1)
SC.6:6-12	Explain the causes of the seasons
SC.6:6-13	Develop a model of the earth-sun-moon system to describe the cyclic patterns of seasons (MS-ESS1-1)
SC.6:6-14	Describe how the sun and moon affect tides

SC.6:7 **Students will demonstrate an understanding of celestial bodies and apply their new knowledge and practices to compare planetary features. (NGSS MS-ESS1-1; MS-ESS1-3, PS-MS-ESS1-2, PS-MS-ESS1-3, MS-ESS1-B-3)**

- SC.6:7-1 Identify the basic properties of different celestial bodies
- SC.6:7-2 Identify and explain how tools are used to observe and measure celestial bodies (MS-ESS1-3)
- SC.6:7-3 Analyze pictorial data to make size comparisons of celestial bodies within the solar system
- SC.6:7-4 Describe how technology is used to detect electromagnetic radiation and produce images to provide information about the universe (MS-ESS1-3)
- SC.6:7-5 Classify stars based on their physical characteristics of absolute brightness, color, and temperature.
- SC.6:7-6 Describe the role of gravity in the motions within galaxies and the solar system. (MS-ESS1-2)
- SC.6:7-7 Describe the role of gravity in the sun's function
- SC.6:7-8 Use patterns to describe the relationships between solar system objects
- SC.6:7-9 Identify characteristics of the electromagnetic spectrum
- SC.6:7-10 Identify how scientists use the electromagnetic spectrum to learn about the universe
- SC.6:7-11 Describe the role of technology in assessing outer space
- SC.6:7-12 Describe the physical properties of stars
- SC.6:7-13 Analyze data to explain how stars are classified
- SC.6:7-14 Analyze the distances between objects in the universe and the methods used to measure those distances

SC.6:8 **Students will demonstrate an understanding of the basics of air masses and their effects on weather, which will allow them to apply their new knowledge and improved practices to make predictions about future weather and climate patterns. (NGSS MS-ESS2-5; PS-MS-ESS2-6, PS-MS-ESS3-2)**

- SC.6:8-1 Define basic weather terms: weather, climate, temperature, humidity, pressure, precipitation, and wind
- SC.6:8-2 Identify and compare the differences between warm and cold air masses and their effect on local weather (MS-ESS2-5)
- SC.6:8-3 Use models to demonstrate how air masses of different temperatures and humidity collide, resulting in a front (MS-ESS2-6)
- SC.6:8-4 Recognize that storms and changeable weather often develop along fronts
- SC.6:8-5 Model the interactions between air masses to show the weather patterns each front brings (MS-ESS2-6)
- SC.6:8-6 Identify the layers of Earth's atmosphere
- SC.6:8-7 Predict the stability and change caused by unequal heating of Earth's atmosphere by the sun
- SC.6:8-8 Identify all parts of the water cycle, including evaporation, condensation, precipitation, runoff, infiltration, and transpiration
- SC.6:8-9 Analyze cause-and-effect relationships in order to predict how temperature determines the type of precipitation for an area
- SC.6:8-10 Use models to demonstrate how meteorologists use observations, patterns, and tools to predict the weather
- SC.6:8-11 Identify evidence that describes the characteristics of different types of severe weather (MS-ESS3-2)
- SC.6:8-12 Identify evidence that describes the causes associated with different types of severe weather (MS-ESS3-2)
- SC.6:8-13 Identify evidence that describes the damage associated with different types of storms (MS-ESS3-2)
- SC.6:8-14 Explain measures that can be taken to ensure safety in a storm (MS-ESS3-2)

SC.6:9 **Students will demonstrate an understanding of how energy is distributed throughout Earth’s atmosphere and oceans by applying new knowledge and improved practices to propose solutions to real-world problems. (NGSS MS-ESS3-2, PS-MS-ESS2-6, MS-ESS2-C-4, MS-ESS2-D-1, MS-ESS2-D-3)**

- SC.6:9-1 Identify evidence that energy moves through Earth’s atmosphere by radiation, conduction, and convection
- SC.6:9-2 Analyze relationships to describe how the greenhouse effect traps and absorbs gasses in the atmosphere
- SC.6:9-3 Identify how energy from the sun is either absorbed or reflected by the different levels of the atmosphere
- SC.6:9-4 Identify evidence that wind results from differences in air pressure from unequal heating of the atmosphere, the jet stream, and ocean currents (MS-ESS2-6)
- SC.6:9-5 Distinguish between local winds and global winds
- SC.6:9-6 Describe how global convection currents and the Coriolis effect interact to make the wind pattern of calm areas and global wind belts around Earth (MS-ESS2-6)
- SC.6:9-7 Identify evidence that global winds drive surface currents
- SC.6:9-8 Describe evidence that unequal heating and the rotation of Earth combine to produce the patterns of ocean circulation (MS-ESS2-6)

SC.6:10 Students will demonstrate an understanding of human impact on the environment and how human actions contribute to a changing climate while developing ideas related to reducing their carbon footprint. (NGSS MS-ESS3-4, MS-ESS3-5, MS-ESS3-C-1, MS-ESS3-D-1)

- SC.6:10-1 Identify “weather” as a description of short-term atmospheric conditions
- SC.6:10-2 Recognize climate as long-term patterns in atmospheric conditions
- SC.6:10-3 Explain how patterns of circulation determine regional climates
- SC.6:10-4 Explain how both natural processes and human activities affect global temperature (MS-ESS3-4)
- SC.6:10-5 Identify ways in which humans have impacted the environment, specifically concentrating on air pollution (MS-ESS3-4)
- SC.6:10-6 Devise possible ways to minimize current environmental impacts
- SC.6:10-7 Provide evidence to support how changes in global temperatures impact sea levels
- SC.6:10-8 Identify the effects of warmer temperatures on living organisms
- SC.6:10-9 Ask questions that would clarify the provided evidence for climate change including natural processes or human activities, as well as their influence on gradual or sudden change in global temperatures and greenhouse gas amounts.

SC.6:11 Students will practice scientific and engineering skills in the classroom and in real-life situations.

- SC.6:11-1 Recognize proper units of measure
- SC.6:11-2 Make observations of phenomena
- SC.6:11-3 Ask scientific questions about provided phenomena
- SC.6:11-4 Collect data through research or experimentation to explore phenomena
- SC.6:11-5 Use collected or provided evidence to explain phenomena
- SC.6:11-6 Utilize scientific tools appropriately in laboratory settings
- SC.6:11-7 Communicate findings from scientific experiments or research