

Time Frame	Topic	Standard	Disciplinary Core Ideas	Activities & Assessments	Vocabulary	Resources
	Space Systems	<p>MS-ESS1-1 Develop and use a model of the Earth-Sun-Moon system to describe the cyclical patterns of lunar phases, eclipses of the Sun and Moon, and seasons.</p> <p>MS-ESS1-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.</p> <p>MS-ESS1-3 Analyze and interpret data to determine scale properties of objects in the solar system</p>	<p>ESS1.A: The Universe & Its Stars - Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1) - Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2)</p> <p>ESS1.B: Earth & the Solar System -The solar system consists of the Sun and a collection of objects, including planets, their moons, comets, and asteroids that are held in orbit around the Sun by its gravitational pull on them. (MS-ESS1-2, MS-ESS1-3) - This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1-1) -The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)</p>		Gravity Eclipse Rotation Revolution Planet Comet	
	Earth's Systems	<p>MS-ESS2-4 Develop a model to describe the cycling of water through Earth's systems driven by energy</p>	<p>ESS2.C: The Roles of Water in Earth's Surface Processes -Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation,</p>			

		from the Sun and the force of gravity.	condensation, sublimation, deposition, precipitation, infiltration, and runoff. (MS-ESS2-4) -Global movements of water and its changes in form are driven by sunlight and gravity (MS-ESS2-4)			
	Weather & Climate	<p>MS-ESS2-5 Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.</p> <p>MS-ESS2-6 Develop and use a model to describe how unequal heating and rotation of Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.</p> <p>MS-ESS3-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.</p>	<p>ESS2.C: The Roles of Water in Earth's Surface Processes -The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5) - Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6)</p> <p>ESS2.D: Weather & Climate - Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6) -Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5) - The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6)</p> <p>ESS3.D: Global Climate Change</p>		Air mass Climate change Fossil fuels Renewable resources Nonrenewable resources	

			<p>-Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge widely in decisions and activities. (MS-ESS3-5)</p>			
	Human Impacts	<p>MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.</p>	<p>ESS3.B: Natural Hazards -Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihood of future events. (MS-ESS3-2)</p>			
	Energy	<p>MS-PS3-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.</p> <p>MS-PS3-4 Plan and conduct an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in change</p>	<p>PS2.A: Definitions of Energy -Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, phases (states), and amounts of matter present. (MS-PS3-3, MS-PS3-4)</p> <p>PS3.B: Conservation of Energy & Energy Transfer -The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the mass of</p>		<p>Temperature Kinetic energy Law of Conservation of Energy</p>	

		in the temperature of the sample of matter.	the sample, and the environment. (MS-PS3-4) -Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3) ETS1.A: Defining & Delimiting an Engineering Problem ETS1.B: Developing Possible Solutions			
	Structures and Properties of Matter	<u>MS-PS1-4</u> Develop a model that predicts and describes changes in particle motion, temperature, and phase (state) of a substance when thermal energy is added or removed.	PS1.A: Structure & Properties of Matter -The changes of state that occur with variations in temperature and/or pressure can be described and predicted using these models of matter. (MS-PS1-4) PS3.A: Definitions of Energy -The term “heat” as used in everyday language refers both to thermal energy (the motion of particles within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. (Secondary to MS-PS1-4) -Temperature is not a form of energy. Temperature is a measurement of the average kinetic energy of the particles in a sample of matter. (Secondary to MS-PS1-4)		Solid Liquid Gas Phase change graph	
	Energy	<u>MS-PS3-6</u> Make observations to provide evidence that energy can be transferred by electric currents.	PS3.B: Conservation of Energy & Energy Transfer -An electric circuit is a closed path in which an electric current can exist. (MS-PS3-6)		Electrons Electricity Electric current Closed circuit	

	<p>Forces & Interactions</p>	<p>MS-PS2-3 Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.</p> <p>MS-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.</p>	<p>PS2.B: Types of Interactions -Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents or magnetic strengths involved and on the distances between the interacting objects. (MS-PS2-3) -Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively). (MS-PS2-5)</p>		<p>Attraction Repulsion Electric field Magnetic field North pole South pole</p>	
	<p>Waves & Electro-magnetic Radiation</p>	<p>MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.</p> <p>MS-PS4-3 Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information that analog signals.</p>	<p>PS4.B: Electromagnetic Radiation -When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. (MS-PS4-2) -The path that light travels can be traced as straight lines, except when it hits a surface between different transparent materials (e.g. air & water; air & glass) obliquely where the light path bends. (MS-PS4-2) -A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. (MS-PS4-2) -However, because light can travel through space, it cannot be a mechanical wave, like sound or water waves. (MS-PS4-2)</p>		<p>Reflection Refraction Absorption Digital data Analog data</p>	

			<p>PS4.C: Information Technologies & Instrumentation</p> <p>-Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3)</p>			
	Chemical Reactions	<p>MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.</p> <p>MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.</p> <p>MS-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.</p> <p>MS-PS1-6 Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy during a</p>	<p>PS1.B: Chemical Reactions</p> <p>- Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different particles and these new substances have different properties from those of the reactants. (MS-PS1-2, MS-PS1-5, MS-PS1-3)</p> <p>-The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5)</p> <p>-Some chemical reactions release energy, others absorb energy. (MS-PS1-6)</p>		<p>Reactants</p> <p>Products</p> <p>Law of Conservation of Mass</p> <p>Chemical reaction</p> <p>Exothermic</p> <p>Endothermic</p>	

		chemical and/or physical process.				
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