BENCHMARK REPORT
SCIENCE GRADE 6

ARCHDIOCESE CHICAGO CATHOLIC SCHOOLS

DOMAIN: Science			
NGSS/ Aspire Practices	**OCS Code:**	**Standards and Benchmarks**	**DOK**
Strand: MS. Structure and Properties of Matter: MS-PS1 Matter and Its Interactions			
Practice 2	**MS-PS1-1.**	**Develop models to describe the atomic composition of simple molecules and extended structures.**	
	6-PS1-1.1a	Identify the atomic composition of simple molecules and extended molecular structures	1
	6-PS1-1.2b	Categorize groups of atoms made from Hydrogen, Carbon, Oxygen, and Nitrogen into simple or extended structures	2
	6-PS1-1.3d	Create drawings of simple and extended structure molecules created from hydrogen, carbon, oxygen, and nitrogen	4
Practice 8	**MS-PS1-3.**	**Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.**	
	6-PS1-3.1a	Identify the characteristics of synthetic materials	1
	6-PS1-3.2b	Gather examples of medical, food, and fuel products made with synthetic materials	2
	6-PS1-3.3c	Interpret information about the impacts of products made with synthetic materials to determine impacts on society	3
Practice 2	**MS-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.**	
	6-PS1-4.1a	Define particle motion, temperature, physical state and thermal energy	1
	6-PS1-4.2b	Describe changes in particle motion, temperature, and physical state when thermal energy is added and removed	2
	6-PS1-4.3c	Create a model that predicts changes in particle motion, temperature, and physical state when thermal energy is added and removed	3
Strand: MS. Chemical Reactions: MS-PS1 Matter and Its Interactions			
Practice 4	**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.**	
	6-PS1-2.1a	Identify properties of matter, changing properties of matter, and chemical reactions	1
	6-PS1-2.2b	Gather information on changes in density, melting point, boiling point, solubility, flammability, or odor as a result of two substances interacting	2
	6-PS1-2.3d	Analyze data on changes in properties before and after substances interact to determine if a chemical reaction has occurred	4
Practice 2	**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.**	
	6-PS1-5.1a	Define conservation of mass	1
	6-PS1-5.2b	Locate data on changes in the total number of atoms before and after a specific chemical reaction occurs	2
	6-PS1-5.3d	Create a visual representation that describes the changes in the total number of atoms before and after a specific type chemical reaction occurs	4
	6-PS1-5.4c	Predict changes in the total number of atoms before and after a variety of different chemical reaction occurs	3
Practice 6	**MS-PS1-6.**	**Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.**	
	6-PS1-6.1b	Gather information on hand warming devices	2
	6-PS1-6.2c	Develop criteria for hand warming devices that will let the least heat into the environment	3
	6-PS1-6.3a	Measure the amount of heat exchange by a hand warmer device	1
	6-PS1-6.4c	Hypothesize modifications that may increase the heat exchange by a hand warmer device	3
	6-PS1-6.5d	Construct a new hand warmer device that can keep hands warm	4

Code consists of Grade (K-8), NGSS Code, Benchmark Number, and DOK Complexity (a, b, c, d).

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	6-PS1-6.6a	Test the modified hand warmer to determine if the heat exchange has improved	1
Strand: MS. Forces and Interactions: MS-PS2 Motion and Stability: Forces and Interactions			
Practice 6	**MS-PS2-1.**	**Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.**	
	6-PS2-1.1a	State Newton's Third Law	1
	6-PS2-1.2c	Predict the severity of injuries and damages to a vehicle when cars collide "head-on" by using Newton's Third Law	3
	6-PS2-1.3c	Describe one way that a car manufacturer can use Newton's Third Law to minimize the severity of injuries and damages to vehicles when cars collide "head-on"	3
Practice 3	**MS-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.**	
	6-PS2-2.1a	Define Newton's three Laws of Motion	1
	6-PS2-2.2b	Categorize an object's forces as "balanced" or "unbalanced" when two objects collide	2
	6-PS2-2.3d	Plan an investigation that examines changes in motion based on an object's force and mass	4
Practice 1	**MS-PS2-3.**	**Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.**	
	6-PS2-3.1b	Locate data on the effects of changing the distance between objects on the strength of magnetic or electric forces	2
	6-PS2-3.2c	Hypothesize factors that might effect data on the effects of changing the distance between objects on the strength of magnetic or electric forces	3
Practice 7	**MS-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.**	
	6-PS2-4.1a	Define gravitational interactions	1
	6-PS2-4.2d	Conduct a simulation or investigation to test the effect of distance and mass on the gravitational force between two objects	4
	6-PS2-4.3c	Cite evidence to support the argument that gravitational force between two objects is effected by mass and distance	3
Practice 3	**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.**	
	6-PS2-5.1a	Define contact force and noncontact force	1
	6-PS2-5.2b	Locate examples of contact and noncontact forces	2
	6-PS2-5.3c	Investigate the existence of a magnetic field when objects are in contact with each other or not	3
	6-PS2-5.4d	Evaluate the experimental design used to provide evidence that a magnetic field exists between objects exerting forces on each other even though they are not in contact	4
Strand: MS. Energy: MS-PS3 Energy			
Practice 4	**MS-PS3-1.**	**Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.**	
	6-PS3-1.1b	Locate data on the relationship between kinetic energy and mass and kinetic energy and speed	2
	6-PS3-1.2b	Graph data which describes the relationship between kinetic energy and mass and kinetic energy and speed	2
	6-PS3-1.3b	Summarize data from a graph to explain the relationship between kinetic energy and mass and kinetic energy and speed	2

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Practice 2	**MS-PS3-2.**	**Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.**	
	6-PS3-2.1a	Define potential energy and a system with potential energy	1
	6-PS3-2.2b	Locate examples of objects that have greater and lesser amounts of stored potential energy	2
	6-PS3-2.3c	Describe the relationship between the distance between objects interacting in a system and the potential energy in the system	3
	6-PS3-2.4d	Create a drawing which shows how changes in distance between objects changes the potential energy stored in the system	4
Practice 6	**MS-PS3-3.**	**Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.**	
	6-PS3-3.1b	Gather information on passive energy devices that can keep food cold	2
	6-PS3-3.2a	List scientific principles that describe how a passive energy device can most effectively keep food cold	1
	6-PS3-3.3a	Measure the amount of heat exchange by a device that keeps food cold	1
	6-PS3-3.4c	Hypothesize modifications that may increase the heat exchange by a device that keeps food cold	3
	6-PS3-3.5d	Construct a device that keeps food cold	4
	6-PS3-3.6a	Test the modified a device that keeps food cold to determine if the heat exchange has improved	1
Practice 3	**MS-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.**	
	6-PS3-4.1a	Define energy transfer of heat, temperature, and average kinetic energy	1
	6-PS3-4.2a	Record the temperature change as ice cubes are placed in a beaker of water and allowed to melt	1
	6-PS3-4.3d	Plan an investigation to measure temperature change while mixing various masses of solid with liquid water	4
	6-PS3-4.4d	Analyze data from an investigation of temperature change while mixing various masses of solid and liquid water to determine the relationship between temperature and masses of solids	4
Practice 7	**MS-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.**	
	6-PS3-5.1b	Locate examples of changes in kinetic energy in an object leading to energy being transferred to or from an object	2
	6-PS3-5.2b	Gather data from more than one experiment that tests changes in kinetic energy in an object leading to energy being transferred to or from an object	2
	6-PS3-5.3c	Make a claim based on examples and data that support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object	3
Strand: MS. Energy: MS-PS4 Waves and their Applications in Technologies for Information Transfer			
Practice 5	**MS-PS4-1.**	**Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.**	
	6-PS4-1.1a	Define amplitude, frequency, and wavelength	1
	6-PS4-1.2b	Describe how the amplitude of a wave is related to the energy in a wave	2
	6-PS4-1.3d	Create a mathematical representation that can be used to describe a simple model for a wave	4
Practice 2	**MS-PS4-2.**	**Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.**	
	6-PS4-2.1a	Define wave frequency, reflection, absorption, and transmission	1
	6-PS4-2.2b	Identify situations in which a wave will be reflected, absorbed, or transmitted through an object	2

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	6-PS4-2.3d	Construct a model that describes how waves are reflected, absorbed, or transmitted	4
Strand: MS. Energy: MS-LS2 Ecosystems: Interactions, Energy, and Dynamics			
Practice 4	**MS-LS2-1.**	**Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.**	
	6-LS2-1.1a	Define the components of an ecosystem and food web	1
	6-LS2-1.2b	Locate data on the effects of resource scarcity and abundance on the biotic and abiotic organisms in a food web	2
	6-LS2-1.3c	Analyze data to provide evidence of the effects of resource scarcity and abundance on the growth and survival of individual and groups of organisms in an ecosystem	3
Strand: MS. Interdependent Relationships in Ecosystems: MS-LS2 Ecosystems: Interactions, Energy, and Dynamics			
Practice 6	**6-LS2-2.**	**Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.**	
	6-LS2-2.1a	Identify the needs of organisms within a given ecosystem	1
	6-LS2-2.2a	Define predatory, competitive, and mutually beneficial relationships in an ecosystem	1
	6-LS2-2.3b	Categorize relationships within a given ecosystem as mutual, competitive, or predatory	2
	6-LS2-2.4c	Predict patterns of interactions among organisms across more than one ecosystem	3
Strand: MS. Space Systems: MS-ESS1 Earth's Place in the Universe			
Practice 4, 2	**MS-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.**	
	6-ESS1-1.1a	Define solar eclipse, lunar phases, seasons, and lunar eclipse	1
	6-ESS1-1.2b	Relate the motions of the sun and Earth to the change in seasons	2
	6-ESS1-1.3b	Relate the motions of the sun and Earth to solar eclipses, lunar phases, and lunar eclipses	2
	6-ESS1-1.4e	Create a model of the Earth-sun-moon system to describe the cyclic patterns of solar and lunar eclipses, lunar phases, or seasons	5
	6-ESS1-1.5c	Use a model of the Earth-sun-moon system to predict changes in the lunar phases, for the following week	3
Practice 2	**MS-ESS1-2.**	**Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.**	
	6-ESS1-2.1a	Define orbital motions, gravity, galaxy, and solar system	1
	6-ESS1-2.2b	Relate orbital motions within galaxies or the solar system to the existence of gravity	2
	6-ESS1-2.3d	Develop a physical or conceptual model that illustrates the role of gravity in orbital motions within galaxies or the solar system	4
	6-ESS1-2.4c	Use a model to explain how changes in the motions within galaxies or the solar system are due to gravity	3
Practice 7	**MS-ESS1-3.**	**Analyze and interpret data to determine scale properties of objects in the solar system.**	
	6-ESS1-3.1a	Define scales used to measure objects in the solar system	1
	6-ESS1-3.2b	Locate data on the size of object layers, surface features, or the orbital radius of objects in the solar system	2
	6-ESS1-3.3b	Compare data on the size of object layers, surface features, or the orbital radius of objects in space to data from the earth	2
	6-ESS1-3.4c	Assess the usefulness of different scales to measure objects in the solar system	3
Strand: MS. History of Earth: MS-ESS2 Earth's Systems			

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Practice	**MS-ESS2-2.**	**Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.**	
	6-ESS2-2.1b	Identify a variety of geoscience processes	2
	6-ESS2-2.2b	Gather information on how a specific geoscience process functions	2
	6-ESS2-2.3b	Locate examples of places where a specific geoscience process has changed the earth's appearance	2
	6-ESS2-2.4c	Cite evidence based on information to explain how a specific geoscience process functions to change the Earth's appearance over time	3
Practice	**MS-ESS2-3.**	**Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.**	
	6-ESS2-3.1a	Define plate motions, continental shapes, and seafloor structures	1
	6-ESS2-3.2b	Locate information on the distribution of fossils, rocks and changes in continental shapes on each continent in relation to techtronic plates	2
	6-ESS2-3.3b	Locate information on seafloor structures in the oceans in relation to techtronic plates	2
	6-ESS2-3.4d	Analyze data to determine the relationship between past plate motions and changes to the continents	4
Strand: MS. Earth's Systems: MS-ESS2 Earth's Systems			
Practice	**MS-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-ESS2-4.1a	Define the hydrologic cycle	1
	6-ESS2-4.2b	Gather information on how the hydrologic cycle functions	2
	6-ESS2-4.3d	Create a conceptual or physical model to show the ways that water changes its state as it moves through pathways of the hydrologic cycle	4
Strand: MS. Weather and Climate: MS-ESS2 Earth's Systems			
Practice	**MS-ESS2-5.**	**Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.**	
	6-ESS2-5.1a	Define flow of air masses; high and low pressure; and temperature, pressure, humidity, precipitation, and wind speed	1
	6-ESS2-5.2b	Gather data on the changes in temperature, pressure, humidity, precipitation, and wind speed when an air mass flows from high to low pressure and when high and low pressure air masses collide	2
Practice 2	**MS-ESS2-6.**	**Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.**	
	6-ESS2-6.2b	Determine the effects of unequal heating and rotation of the earth on the large-scale movement of air over land or the ocean	2
Strand: MS. Earth's Systems: MS-ESS3 Earth and Human Activity			
Practice	**MS-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.**	
	6-ESS3-1.1a	Find examples of mineral, energy, and water non-renewable resources throughout the world	1
	6-ESS3-1.2b	Determine the locations of examples of non-renewable resources throughout the world	2
	6-ESS3-1.3b	Gather information on how the distribution of examples of non-renewable resources relates to past geoscience processes	2
	6-ESS3-1.4c	Explain reasons that geoscience processes will continue to create an uneven distribution of mineral, energy, and water non-renewable resources	3