Strand: Physical Science

Mississippi Department of Education
***2010 Mississippi Science Framework* Vertical Alignment**

Kindergarten	First Grade	Second Grade	Third Grade	Fourth Grade	Fifth Grade	Sixth Grade	Seventh Grade	Eighth Grade
Properties of matter								
2a. Classify properties of objects and materials according to their observable characteristics. (DOK 2) • Materials (e.g., wood, paper, plastic, and metal) • Matter (solid or liquid) • Objects that sink or float in water	2a. Recognize that most things are made of parts. (DOK 1) 2f. Compare and classify solids and liquids. (DOK 2)	2a. Investigate to conclude that when water changes to ice and then melts, the amount of water is the same as it was before freezing. (DOK 2) 2f. Compare and classify solids, liquids, and gasses. (DOK 2	2a. Investigate to conclude that the weight of an object is always the sum of its parts, regardless of how it is assembled, (e.g., Lego creation/ separate blocks, bucket/cups of sand, roll/stacks of pennies, bag/individual potatoes, etc.) (DOK 2)	2a. Recognize that materials may be composed of parts that are too small to be seen without magnification. (DOK 1)	2a. Determine how the properties of an object affect how it acts and interacts. (DOK 2)	2a. Recognize that all atoms of a given element are all alike but different from atoms of other elements. (DOK 1)	2a. Identify patterns (e.g., atomic mass, increasing atomic numbers) and common characteristics (metals, nonmetals, gasses) of elements found in the periodic table of elements. (DOK 2)	2a. Identify patterns found in chemical symbols, formulas, reactions, and equations that apply to the law of conservation of mass. (DOK 1) • Chemical symbols and chemical formulas of common substances such as NaCl (table salt), H_20 (water), $C_6H_{12}O_6$ (sugar), O_2 (oxygen gas), CO_2 (carbon dioxide), and N_2 (nitrogen gas) • Balanced chemical equations such as photosynthesis and respiration
Changes in Properties of Matter								
2b. Differentiate what happens to water left in an open container (disappears) and water left in a closed container (remains). (DOK 1)	2b. Describe properties and changes of objects and materials. (DOK 1) • Processes of melting and freezing • How water evaporates and disappears into the atmosphere • How water condenses onto cold surfaces	2b. Investigate and describe properties and changes of matter. (DOK 2) • Unique properties of states of matter (Gases are easily compressed while solids and liquids are not; the shape of a solid is independent of its container; liquids and gases take the shape of their containers) • Physical changes that occur when a liquid is changed by boiling or freezing • Chemical changes (e.g., burning wood, making ice cream, cooking an egg) that occur when matter cannot go back to its original state	2b. Explore and identify physical changes of matter, including melting, freezing, boiling, evaporation, and condensation. (DOK 2) 2g. Cite evidence to explain why heating or cooling may change the properties of materials (e.g., boiling an egg, evaporating water, chilling gelatin, making ice cream, etc.) (DOK 2)	2b. Distinguish between physical and chemical changes and between objects composed of a single substance from those composed of more than one substance. (DOK 2)	2b. Differentiate between elements, compounds, and mixtures and between chemical and physical changes (e.g., gas evolves, color, and/or temperature changes). (DOK 2) 2f. Describe physical properties of matter (e.g., mass, density, boiling point, freezing point) including mixtures and solutions. (DOK 1) • Filtration, sifting, magnetism, evaporation, and flotation • Effects of tempera-ture changes on the solubility of substances	2b. Distinguish physical properties of matter (e.g., melting points, boiling points, solubility) as it relates to changes in states. (DOK 2) • Between solids, liquids, and gases through models that relate matter to particles in motion • Solubility in water of various solids to activities (e.g., heating, stirring, shaking, crushing) on the rate of solution • Use of solubility differences to identify components of a mixture (e.g., chromatography	2b. Categorize types of chemical changes, including synthesis and decomposition reactions, and classify acids and bases using the pH scale and indicators. (DOK 2)	2b. Predict the properties and interactions of given elements using the periodic table of chemical elements. (DOK 2) • Metals and nonmetals • Acids and bases • Chemical changes in matter (e.g., rusting [slow oxidation], combustion [fast oxidation], food spoilage)

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Motions and Forces								
2c. Compare types of forces and motion. (DOK 1) • External motion of objects (e.g., straight-line, circular, back-and-forth, and rotational) • Internal motion of objects (e.g., bending and stretching)	2c. Describe the effects of various forms of motion and of forces on objects. (DOK 2) • Different forms of motion (sliding, rolling, straight line, circular, back-and-forth) • Effects that motion can produce (spilling, breaking, bending)	2c. Describe observable effects of forces, including buoyancy, gravity, and magnetism. (DOK 1)	2c. Investigate and describe forces affecting motion in simple machines (e.g., lever, wheel and axle, block and tackle, inclined plane, screw.) (DOK 2)	2c. Determine the causes and effects of forces on motion. (DOK 2) • That force exerted over a distance causes work to be done and that the result (work) is the product of force and distance • Friction on moving objects and actions that increase or decrease friction • Momentum and inertia	2c. Investigate the motion of an object in terms of its position, direction of motion, and speed. (DOK 2) • The relative positions and movements of objects using points of reference (distance vs. time of moving objects) • Force required to move an object using appropriate devices (e.g., spring scale) • Variables that affect speed (e.g., ramp height/length/ surface, mass of object) • Effects of an unbalanced force on an object's motion in terms of speed and direction	2c. Investigate and describe the effects of forces acting on objects. (DOK 2) • Gravity, friction, magnetism, drag, lift, and thrust • Forces affecting the motion of objects 2f. Develop a logical argument to explain how the forces which affect the motion of objects have real-world applications including (but not limited to) examples of Mississippi's contributions as follows: (DOK 3) • Automotive industry (Nissan's new production plant is located in Canton, MS. Toyota's new facility is in Tupelo, MS.) • Aerospace industry (The Raspet Flight Research Laboratory, housed at Mississippi State University, is one of the premier university flight research facilities in the country.) • Shipbuilding industry (Ingall's Shipbuilding, of Pascagoula, MS, is a leading supplier of marine vessels to the United States Navy.)	2c. Compare the force (effort) required to do the same amount of work with and without simple machines (e.g., levers, pulleys, wheel and axle, inclined planes). (DOK 2) 2f. Describe the effects of unbalanced forces on the speed or direction of an object's motion. (DOK 2) • Variables that describe position, distance, displacement, speed, and change in speed of an object • Gravity, friction, drag, lift, electric forces, and magnetic forces	2c. Distinguish the motion of an object by its position, direction of motion, speed, and acceleration and represent resulting data in graphic form in order to make a prediction. (DOK 2) 2f. Recognize Newton's three laws of motion and identify situations that illustrate each law (e.g., inertia, acceleration, action, and reaction forces). (DOK 2)

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Transfer of Energy: Magnetism and Electricity								
2d. Compare the interaction between two magnets and the interaction between magnets and other objects (such as iron, other metals, wood, and water). (DOK 1)	2d. Differentiate between interactions of two magnets and the interaction of a magnet with objects made of iron, other metals, and nonmetals. (DOK 1)	2d. Classify materials that are and are not attracted to magnets and cite examples of useful magnetic tools in everyday living (e.g., can opener, compass, refrigerator door seal). (DOK 2)	2d. Differentiate between potential and kinetic energy and recognize their conversions. (DOK 1) • Potential to kinetic (e.g., winding a clock/clock begins ticking) • Kinetic to potential (e.g., roller coaster moving downward/upward to the top of the hill)	2d. Explain how energy flowing through an electrical circuit can be converted from electrical energy to light, sound, or heat energy. (DOK 1) • Parts of an electric circuit and resulting actions when circuits are opened or closed • Construction and uses of electromagnets • Energy transferred through an electrical circuit to a bulb or bell to its surroundings as light, sound, and heat (thermal) energy	2d. Categorize examples of potential energy as gravitational (e.g., boulder on a hill, child on a slide), elastic (e.g., compressed spring, slingshot, rubber band), or chemical (e.g., unlit match, food). (DOK 2)	2d. Investigate the mechanical and chemical forms of energy and demonstrate the transformations from one form to another. (DOK 2) • Energy transformations represented in the use of common household objects • Mechanical energy transformed to another form of energy (e.g., vibrations, heat through friction) • Chemical energy transformed to another form of energy (e.g., light wands, lightning bugs, batteries, bulbs)	2d. Describe cause and effect relationships of electrical energy. (DOK 2) • Energy transfers through an electric circuit (using common pictures and symbols) • Electric motor energy transfers (e.g., chemical to electrical to mechanical motion) and generators	2d. Relate how electrical energy transfers through electric circuits, generators, and power grids including (but not limited to) contributions from Mississippi companies. (DOK 2) • The Electrical Power Products Division of Howard Industries is a leading manufacturer of electrical distribution equipment in such locations as Laurel and Ellisville, MS. • Kuhlman Electric Corporation, located in Crystal Springs, MS
Transfer of Energy: Light								
	2e. Describe changes in shadows over time and predict how a shadow will look as the light source moves. (DOK 2)	2e. Recognize that an object can be seen only if either light falls on it or it emits light, and that color is a property of light. (DOK 1)	2e. Explain how light waves travel (e.g., in a straight line until they strike an object, through transparent and translucent objects, from reflecting and refracting surfaces, at the surface of opaque objects). (DOK 1)	2e. Describe how light behaves (travels in a straight line, is absorbed, reflected, or refracted, appears transparent or translucent). (DOK 1)	2e. Differentiate between the properties of light as reflection, refraction, and absorption. (DOK 1) • Image reflected by a plane mirror and a curved-surfaced mirror • Light passing through air or water • Optical tools such as prisms, lenses, mirrors, and eyeglasses	2e. Apply the laws of reflection and refraction to explain everyday phenomena (DOK 2) • Properties of reflection, refraction, transmission, and absorption of light • Images formed by plane, convex, and concave lenses and mirrors, and reflecting and refracting telescopes. • Objects that are opaque, transparent, or translucent	2e. Distinguish how various types of longitudinal and transverse waves (e.g., water, light, sound, seismic,) transfer energy. (DOK 2) • Frequency • Wavelength • Speed • Amplitude	2e. Contrast various components of the electromagnetic spectrum (e.g., infrared, visible light, ultraviolet) and predict their impacts on living things. (DOK 2)

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Transfer of Energy: Sound								
	2g. Identify vibrating objects that produce sound and classify sounds (e.g., high or low pitched, loud or soft). (DOK 1)	2g. Identify vibration as the source of sound and categorize different types of media (e.g., wood, plastic, water, air, metal, glass) according to how easily vibrations travel. (DOK 2)	2f. Differentiate the movement of vibrations in waves (e.g., sound and seismic waves), and cite examples to explain that vibrations move through different materials at different speeds. (DOK 1)	2f. Investigate and draw conclusions about the relationship between the rate of vibrating objects and the pitch of the sound. (DOK 3)				
Transfer of Energy: Heat								
				2g. Describe how heat flows from a warm object to a cold one and categorize examples of materials that may or may not be used as insulators. (DOK 2)	2g. Categorize materials as conductors or insulators and discuss their real life applications (e.g., building, construction, clothing, animal covering). (DOK 2)	2g. Predict and explain factors that affect the flow of heat in solids, liquids, and gases. (DOK 3) • Insulating factors in real-life applications (e.g., building, construction, clothing, animal covering) • Conduction, convection, or radiation factors used to enhance the flow of heat • Temperature differences on the movement of water		