

Adopted 10-6-10

SC K-12.2 Comprehensive Science Standard – Physical Science

Students will integrate and communicate the information, concepts, principles, processes, theories, and models of the Physical Sciences to make connections with the natural and engineered world.

2. Physical Science	Grade Band Standards			
	K-2	3-5	6-8	9-12
1. Matter	SC2.2.1 Students will observe and describe properties of objects and their behavior.	SC5.2.1 Students will explore and describe the physical properties of matter and its changes.	SC8.2.1 Students will identify and describe the particulate nature of matter including physical and chemical interactions.	SC12.2.1 Students will investigate and describe matter in terms of its structure, composition and conservation.
Properties and Structure of Matter	SC2.2.1.a Observe physical properties of objects (freezing and melting, sinking and floating, color, size, texture, shape, weight)	SC5.2.1.a Identify mixtures and pure substances	SC8.2.1.a Compare and contrast elements, compounds, and mixtures	
	SC2.2.1.b Separate and sort objects by physical attributes	SC5.2.1.b Identify physical properties of matter (color, odor, elasticity, weight, volume)	SC8.2.1.b Describe physical and chemical properties of matter	SC12.2.1.a Recognize bonding occurs when outer electrons are transferred (ionic) or shared (covalent)
	SC2.2.1.c Measure objects using standard and non-standard units	SC5.2.1.c Use appropriate metric measurements to describe physical properties		
States of Matter	SC2.2.1.d Identify solids and liquids and recognize that liquids take the shape of their container	SC5.2.1.d Identify state changes caused by heating and cooling solids, liquids, and gases	SC8.2.1.c Recognize most substances can exist as a solid, liquid, or gas depending on temperature	SC12.2.1.b Describe the energy transfer associated with phase changes between solids, liquids, and gases
			SC8.2.1.d Compare and contrast solids, liquids, and gases based on properties of these states of matter	SC12.2.1.c Describe the three normal states of matter (solid, liquid, gas) in terms of energy, particle arrangement, particle motion, and strength of bond between molecules

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Physical and Chemical Changes			<p>SC8.2.1.e Distinguish between physical and chemical changes (phase changes, dissolving, burning, rusting)</p> <p>SC8.2.1.f Recognize conservation of matter in physical and chemical changes</p>	<p>SC12.2.1.d Recognize a large number of chemical reactions involve the transfer of either electrons (oxidation/reduction) or hydrogen ions (acid/base) between reacting ions, molecules, or atoms</p> <p>SC12.2.1.e Identify factors affecting rates of chemical reactions (temperature, particle size, surface area)</p>
Atomic Structure				<p>SC12.2.1.f Recognize the charges and relative locations of subatomic particles (neutrons, protons, electrons)</p> <p>SC12.2.1.g Describe properties of atoms, ions, and isotopes</p>
Classification of Matter			<p>SC8.2.1.g Classify substances into similar groups based on physical properties</p>	<p>SC12.2.1.h Describe the organization of the periodic table of elements with respect to patterns of physical and chemical properties</p>

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2. Force and Motion	SC2.2.2 Students will compare relative position and motion of objects.	SC5.2.2 Students will identify the influence of forces on motion.	SC8.2.2 Students will investigate and describe forces and motion.	SC12.2.2 Students will investigate and describe the nature of field forces and their interactions with matter.
Motion	SC2.2.2.a State location and/or motion relative to another object or its surroundings (in front of, behind, between, over, under, faster, slower, forward and backward, up and down) SC2.2.2.b Describe how objects move in many different ways (straight, zigzag, round and round, back and forth, and fast and slow)	SC5.2.2.a Describe motion by tracing and measuring an object's position over a period of time (speed)	SC8.2.2.a Describe motion of an object by its position and velocity	SC12.2.2.a Describe motion with respect to displacement and acceleration
Inertia/Newton's 1 st law			SC8.2.2.b Recognize an object that is not being subjected to a force will continue to move at a constant speed in a straight line or stay at rest (Newton's 1 st law)	SC12.2.2.b Describe how the law of inertia (Newton's 1 st law) is evident in a real-world event
Forces/Newton's 2 nd law		SC5.2.2.b Describe changes in motion due to outside forces (push, pull, gravity)	SC8.2.2.c Compare the motion of objects related to the effects of balanced and unbalanced forces	SC12.2.2.c Make predictions based on relationships among net force, mass, and acceleration (Newton's 2 nd law)

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Newton's 3 rd law				<p>SC12.2.2.d Recognize that all forces occur in equal and opposite pairs (Newton's 3rd law)</p> <p>SC12.2.2.e Describe how Newton's 3rd law of motion is evident in a real-world event</p>
Universal Forces		<p>SC5.2.2.c Describe magnetic behavior in terms of attraction and repulsion</p>	<p>SC8.2.2.d Recognize that everything on or around Earth is pulled towards Earth's center by gravitational force</p>	<p>SC12.2.2.f Describe gravity as a force that each mass exerts on another mass, which is proportional to the masses and the distance between them</p> <p>SC12.2.2.g Recognize that an attractive or repulsive electric force exists between two charged particles and that this force is proportional to the magnitude of the charges and the distance between them</p>

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3. Energy		SC5.2.3 Students will observe and identify signs of energy transfer.	SC8.2.3 Students will identify and describe how energy systems and matter interact.	SC12.2.3 Students will describe and investigate energy systems relating to the conservation and interaction of energy and matter.
Sound/Mechanical Waves		SC5.2.3.a Recognize that sound is produced from vibrating objects; the sound can be changed by changing the vibration	SC8.2.3.a Recognize that vibrations set up wave-like disturbances that spread away from the source (sound, seismic, water waves) SC8.2.3.b Identify that waves move at different speeds in different materials	SC12.2.3.a Describe mechanical wave properties (speed, wavelength, frequency, amplitude) and how waves travel through a medium SC12.2.3.b Recognize that the energy in waves can be changed into other forms of energy
Light		SC5.2.3.b Recognize that light travels in a straight line and can be reflected by an object (mirror) SC5.2.3.c Recognize that light can travel through certain materials and not others (transparent, translucent, opaque)	SC8.2.3.c Recognize that light interacts with matter by transmission (including refraction), absorption, or scattering (including reflection) SC8.2.3.d Recognize that to see an object, light from the surface of the object must enter the eye; the color seen depends on the properties of the surface and the color of the available light sources	SC12.2.3.c Recognize that light can behave as a wave (diffraction and interference)

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Heat		<p>SC5.2.3.d Identify ways to generate heat (friction, burning, incandescent light bulb)</p> <p>SC5.2.3.e Identify materials that act as thermal conductors or insulators</p>	<p>SC8.2.3.e Recognize that heat moves from warmer objects to cooler objects until both reach the same temperature</p>	<p>SC12.2.3.d Distinguish between temperature (a measure of the average kinetic energy of atomic or molecular motion) and heat (the quantity of thermal energy that transfers due to a change in temperature)</p> <p>SC12.2.3.e Compare and contrast methods of heat transfer and the interaction of heat with matter via conduction, convection, and radiation</p>
Electricity/Magnetism		<p>SC5.2.3.f Recognize that the transfer of electricity in an electrical circuit requires a closed loop</p>		<p>SC12.2.3.f Recognize that the production of electromagnetic waves is a result of changes in the motion of charges or by a changing magnetic field</p> <p>SC12.2.3.g Compare and contrast segments of the electromagnetic spectrum (radio, micro, infrared, visible, ultraviolet, x-rays, gamma) based on frequency and wavelength</p>

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Nuclear				SC12.2.3.h Recognize that nuclear reactions (fission, fusion, radioactive decay) convert a fraction of the mass of interacting particles into energy, and this amount of energy is much greater than the energy in chemical interactions
Conservation			SC8.2.3.f Describe transfer of energy from electrical and magnetic sources to different energy forms (heat, light, sound, chemical) SC8.2.3.g Recognize all energy is neither created nor destroyed	SC12.2.3.i Interpret the law of conservation of energy to make predictions for the outcome of an event
Mechanical Energy				SC12.2.3.j Identify that all energy can be considered to be either kinetic, potential, or energy contained by a field (e.g. electromagnetic waves)
Chemical Energy				SC12.2.3.k Identify endothermic and exothermic reactions