Physical Science

PS 1 - All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).

	5-6	7-8
1. COMPOSITION	S(PS1)-6-1.1 Recognize that all matter is composed of minute particles called atoms, and explain that all substances are composed of atoms, each arranged into different groupings. S(PS1)-6-1.2 Identify elements as substances that contain only one kind of atom and explain that elements do not break down by normal laboratory reactions, such as heating, exposure to electric current, and reaction to acid. S(PS1)-6-1.3 Recognize that over one hundred elements exist, and identify the periodic table as a tool for organizing the information about them.	S(PS1)-8-1.1 Explain that atoms often combine to form a molecule or formula unit (crystal). S(PS1)-8-1.2 Recognize that elements can combine in a variety of ways to form compounds. S(PS1)-8-1.3 Differentiate between an atom and an molecule S(PS1)-8-1.4 Differentiate between a mixture and a pure substance. S(PS1)-8-1.5 Identify methods used to separate mixtures, such as boiling, filtering, chromatography and screening. **S(PS1)-8-1.6 Collect data or use data provided to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter). PS1 (5-8) INQ+SAE -3** **S(PS1) -8 - 1.7 Given graphic or written information, classify matter as atom/molecule or element/compound (Not the structure of an atom). PS1 (5-8) MAS –5**

Items boxed in bold are Assessment Targets for the NECAP Science Assessment

All other items are for local assessment

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2. PROPERTIES	S(PS1)-6-2.1 Identify elements according to their common properties, such as highly reactive metals, less reactive metals, highly reactive non-metals and almost non-reactive gases. S(PS1)-6-2.2 Identify substances by their physical and chemical properties, such as magnetism, conductivity, density, solubility, boiling and melting points. S(PS1)-6-2.3 Differentiate between weight and mass. S(PS1)-6-2.4 Identify energy as a property of many substances.	S(PS1)-8-2.1 Differentiate between volume and mass and define density. S(PS1)-8-2.2 Explain how different substances of equal volume usually have different weights. S(PS1)-8-2.3 Identify a molecule as the smallest part of a substance that retains its properties. **S(PS1)-8-2.4 Investigate the relationships among mass, volume and density. [PS1 (5-8) INQ -1]** **S(PS1)-8-2.5 Given data about characteristic properties of matter (e.g., melting and boiling points, density, solubility) identify, compare, or classify different substances. [PS1 (5-8) INQ+POC –2]** **S(PS1)-8-2.6 Represent or explain the relationship between or among energy, molecular motion, temperature, and states of matter. [PS1 (5-8) SAE+MAS – 4]**

PS 2 - Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.

	5-6	7-8
1. CHANGE	S(PS2)-6-1.1 Differentiate between a physical change, such as melting, and a chemical change, such as rusting.	S(PS2)-8-1.1 Explain how substances react chemically with other substances to form new substances, known as compounds, and that in such recombination's, the properties of the new substances may be very different from those of the old. S(PS2)-8-1.2 Identify factors that affect reaction rates, such as temperature, concentration and surface area, and explain that dissolving substances in liquids often accelerates reaction rates. S(PS2)-8-1.3 Explain that oxidation involves combining oxygen with another substance, as in burning or rusting. S(PS2)-8-1.4 Explain that states of matter depend on the arrangement of the molecules and their motion. **S(PS2)-8-1.5 Given a real-world example, show that within a system, energy transforms from one form to another (i.e., chemical, heat, electrical, gravitational, light, sound, mechanical).** [PS2 (5-**8**) SAE+POC- **6**]
2. CONSERVATION	S(PS2)-6-2.1 Describe how	S(PS2)-8-2.1 Explain the law of conservation of energy.

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	mass remains constant in a closed system and provide examples relating to both physical and chemical change.	**S(PS2)-8-2.2** Collect data or use data provided to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter) [PS1 (5-**8**) INQ+SAE -**3**]
3. ENERGY	S(PS2)-6-3.1 Explain that the pitch of a sound is dependent on the frequency of the vibration producing it. S(PS2)-6-3.2 Explain that sound vibrations move at different speeds, have different wavelengths and establish wave-like disturbances that emanate from the source. S(PS2)-6-3.3 Recognize that energy, in the form of heat, is usually a by- product when one form of energy is changed to another, such as when machines convert stored energy to motion.	S(PS2)-8-3.1 Differentiate between kinetic energy, which is the energy of motion and potential energy, which depends on relative position. S(PS2)-8-3.2 Recognize the Sun is a major energy source for the Earth, and describes how it affects the planet's surface. S(PS2)-8-3.3 Describe ways light can interact with matter, such as transmission, which includes refraction, absorption, and scattering, which includes reflection. S(PS2)-8-3.4 Explain that the human eye can only detect wavelengths of electromagnetic radiation within a narrow range, and explain that the differences of wavelength within that range of visible light are perceived as differences in color.

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	S(PS2)-6-3.4 Explain that heat energy moves from warmer materials or regions to cooler ones through conduction, convection, and radiation. S(PS2)-6-3.5 Explain how electrical circuits can be used to transfer energy in order to produce heat, light, sound, and chemical changes.	S(PS2)-8-3.5 Recognize that most chemical and nuclear reactions involve a transfer of energy. **S(PS2)-8-3.6 Use data to draw conclusions about how heat can be transferred (convection, conduction, radiation). [PS2 (5-8) INQ+SAE+POC – 7]**

PS 3 -The motion of an object is affected by force.

	5-6	7-8
1. FORCES	S(PS3)-6-1.1 Recognize that just as electric currents can produce magnetic forces, magnets can cause electric currents. S(PS3)-6-1.2 Explain that when a force is applied to an object, it reacts in one of three ways: the object either speeds up, slows down, or goes in a different direction. S(PS3)-6-1.3 Describe the relationship between the strength of a force on an object and the resulting effect, such as the greater the force, the greater the change in motion.	S(PS3)-8-1.1 Explain that the force of gravity gets stronger the closer one gets to an object and decreases the further away one gets from it. S(PS3)-8-1.2 Recognize the general concepts related to gravitational force. **S(PS3)-8-1.3 Use data to determine or predict the overall (net) effect of multiple forces (e.g., friction, gravitational, magnetic) on the position, speed, and direction of motion of objects.** **[PS3 (5-8) INQ+ POC –8]**
2. MOTION	S(PS3)-6-2.1 Explain the how balanced and unbalanced forces are related to an object's motion. S(PS3)-6-2.2 Explain that an object's motion can be tracked and measured over time and that the data can be used to describe its position.	S(PS3)-8-2.1 Explain that an object in motion that is unaffected by a force will continue to move at a constant speed and in a straight line. S(PS3)-8-2.2 Explain how the motion of an object can be described by its position, direction of motion, and speed, and illustrate how that motion can be measured and represented graphically.

PS4 - The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.		
	5-6	**7-8**
1. DESIGN TECHNOLOGY	S(PS4)-6-1.1 Understand that scientific principles are used in the design of technology.	S(PS4)-8-1.1 Understand that design features, such as size shape, weight, and function, must be considered when designing new technology.
2. TOOLS	S(PS4)-6-2.1 Recognize that manufacturing processes use a variety of tools and machines to separate, form, combine and condition natural and synthetic materials.	S(PS4)-8-2.1 Demonstrate appropriate use of tools, such as rulers, calculators, balances, and graduated cylinders to measure and calculate volume and mass.
3. SOCIAL ISSUES (LOCAL & GLOBAL) ENERGY, POWER, AND TRANSPORTATION MANUFACTURING	S(PS4)-6-3.1 Explain how a battery changes chemical energy into electrical energy. S(PS4)-6-3.2 Demonstrate how to produce a magnetic force with an electric current, such as an electromagnet, and how to produce an electric current with a magnet, such as a generator. S(PS4)-6-3.3 Provide an example to show that manufacturing processes involve changing natural materials into	S(PS4)-8-3.1 Explain how humans use natural resources, such as flowing water and burning of coal, oil, or natural gas to generate electrical energy in power plants. S(PS4)-8-3.2 Describe how natural resources, such as coal, oil and natural gas are tapped for use in power plants, and how alternative sources, such as solar, wind, water, nuclear are tapped for power, and compare the advantages and disadvantages of each source. S(PS4)-8-3.3 Differentiate between durable goods, which are designed to operate for a long period of

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	finished products through a series of processes that involve physical and/or chemical changes.	time, and non-durable goods, which are only intended to operate for a short period of time.
4. CAREER TECHNICAL EDUCATION CONNECTIONS	S(PS4)-6-4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of physical science.	S(PS4)-8-4.1 Understand that some scientific jobs/careers involve the application of physical science content knowledge and experience in specific ways that meet the goals of the job.