Essential Standards Chart: What is it we expect students to learn?

Grade	6-8	**Subject**	Science	[redacted]	Team Members	Gracie Wright	8th Grade Science
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Standard Description	Example Rigor	Prerequisite Skills	Phenomenons/Anchoring Activities/Labs	When Taught?	Extension Concepts
What is the essential standard to be learned? **Describe in student-friendly vocabulary.**	**What does proficient student work look like?** **Provide an example and/or description.**	**What prior knowledge, skills, and/or vocabulary is/are needed for a student to master this standard?**	**What kinds of demonstrations and activities can be used to help students develop a meaningful connection with the essential standard?**	**In what grade level(s) will this standard be taught?** **At what time of the year will this standard be taught?**	**What will we do when students have learned the essential standard(s)?**
MS-PS1-4. 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. *When heat is added or removed it can affect…* 1) *How the particles that make up something move* 2) *The temperature of something* 3) *An object's state of matter.*	Drawing a model that accurately represents particle movement of an object when heat is added or removed.	**Vocabulary -** Matter, Temperature, Heat, Freezing, Melting, Thermal Energy, Thermometer **Content/Skills:** - Identify the states of matter (solid, liquid, gas) - Changes to the state of matter of an object are caused by heating or cooling it. - Measuring temperature - Read a thermometer	PHET Phases of Matter Simulation Heat transfer blocks (with ice) Water Cycle Cloud in a jar Convection currents	6th Grade (1st MP) 7th Grade	Include **pressure** as a part of the model being developed Students evaluate the limitations of the model
MS-PS1-7: Use evidence to illustrate that density is a property that can be used to identify samples of matter. *All substances have a certain density, and we can calculate an object's density*	Student must be able to calculate density (using the mass and volume they have measured) and then use the density to identify the substance compared to a known density	**Vocabulary -** mass, volume, meters, liters, and grams **Content/Skills:** ● Calculate both mass and volume ● Read and use a metric ruler	Density block lab Calculating density of unknowns PHET Density Simulations Diet vs Regular Soda Can Sink or Float	6th (1st MP-beginning of 2nd) 7th grade	Use observations, measurements, and calculations as evidence to compare unknown samples with known density values to identify the unknown substance

to figure out what it's made of.		• Read and use a balance • Calculate volume using displacement • Read a graduated cylinder • Compare a calculated value to a list of known values	Freshwater vs Saltwater sink or float Sensory Deprivation Float Tanks - How do they work? Submersibles/Submarines and Ocean Depth - Getting an object to float in the middle of a column of water		Use density calculations to determine if something is a pure substance or a mixture
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. *Look at data about substances before and after they interact. Use the information to figure out if new substances were formed after the interaction.*	Given at least two substances that interact, students can gather evidence (through observation and measurements) before and after and then conclude whether the interaction resulted in a physical or a chemical change.	**Vocabulary** - Interact, substance, mass, volume, property, particle, reaction **Content/Skills:** - Measuring mass with a balance - Making observations - Using observations to describe something - Read a graduated cylinder - Compare numbers (data) and find differences/similarities	Corroding copper (penny) Making slime Burning food Burning salts (flame color demonstration) Copper chloride and aluminum How do test kits work? Magnesium and HCl Mentos and Coca Cola Elephant Toothpaste Making Cheese? Turing ingredients into food (interdisciplinary with FACS and Agriculture) Yeast and Sugar	7th grade 8th grade	Students plan and conduct their own investigation of at least two substances interacting. Are there examples where certain conditions are required for a chemical reaction to actually happen?

			Something where **BOTH** physical changes and chemical changes		
~~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.~~ ~~*Demonstrate that the amount of matter at the start of the chemical reaction is the same as at the end of the reaction.*~~	~~Correctly develop and use a model to demonstrate a chemical reaction (ie synthesis reactions, digestive reactions and photosynthesis and cellular respiration).~~	~~**Vocabulary -** Chemical Change (Reaction), Atom, Molecule, Chemical Bond, Mass, Matter, Digestion, Synthesis~~ ~~**Content/Skills:**~~ ~~- Using ball and stick models to build molecules~~ ~~- Be able to identify which atoms are represented in the ball and stick models using a chart~~ ~~- Describe examples of chemical change~~	~~Ball and Stick modeling~~ ~~Marshmallow/candy and Toothpick models~~ ~~Draw models on paper~~ ~~Digital molecular models on the computer~~ ~~Taylor Paper Throwing activity?~~	~~7th Grade~~ ~~8th Grade~~	~~Model should reflect balanced equations to show conservation of matter.~~
MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. *Apply Newton's Third Law to describe the interaction between two colliding objects.*				8th - Rock	
MS-PS2-2. Plan and conduct 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.			Heating empty soda can and tossing in water demo (pressure change)	8th - Boulder	

Provide evidence that an object's motion is affected by all the forces acting on it.					
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. *Use data to describe the relationship between the mass and speed of an object on its kinetic energy.*					
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. *Use data to show that the potential energy stored in objects changes when the distance between them changes.*					
MS-PS3-5. Construct, use, and present an argument to support the claim that when work is done on or by a system, the energy of the system changes as energy is transferred to or from the system. *Use data to support the idea that energy is transferred between systems when work is done.*				7th Grade - Boulder 8th - Rock	

MS-PS4-1. Develop a model and use mathematical representations to describe waves that includes frequency, wavelength, and how the amplitude of a wave is related to the energy in a wave. *Describe how the characteristics of a wave (frequency, wavelength, and amplitude) are related to its energy.*				7th Grade	
MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. *Use a model to show how different materials affect the waves that interact with them.*				7th Grade	
MS-LS1-1. Plan and conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. *Provide evidence that all living things are made up of one or more cells that can vary in type.*				7th - Boulder 8th - Rock	
MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.				7th - Boulder 8th - Boulder	

Explain that a cell is a system made up of smaller parts that work together to accomplish a function.					
MS-LS1-3. Construct an explanation supported by evidence for how the body is composed of interacting systems consisting of cells, tissues, and organs working together to maintain homeostasis. *Explain that an organism is a system with multiple levels of organization which work together to maintain homeostasis.*				7th - Boulder 8th - Boulder	
~~MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli, resulting in immediate behavior…~~ ~~*Show how a stimulus results in an immediate response.*~~				7th - Butterfly	
MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. *Explain what types of matter and energy are needed for photosynthesis, and then what types of matter and energy are produced as a result.*				7th - Butterfly 8th - Rock	
MS-LS1-7. Develop a model to describe how food molecules are rearranged				8th - Boulder	

through chemical reactions to release energy during cellular respiration and/or form new molecules that support growth as this matter moves through an organism. *Describe how food is broken down and used in cellular respiration to produce new molecules and energy that organisms can use.*					
MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. *Describe how matter is cycled and energy is transferred among living and nonliving things.*	Develop and accurately label a food web using information about populations and ecosystems.	**Vocabulary**: Matter, energy, food, living, nonliving **Content Skills** ● All living things need food (matter and energy) ● Plants make food ● Animals consume food		7th - Boulder 8th - Butterfly	
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 **AND** MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. *Use evidence to show that changes to any part of an ecosystem may affect a population.*				7th - Rock 8th Rock	

MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively. *Organisms have adaptations that increase the chances of successful reproduction.*				8th - Rock	
MS-LS3-1. Develop and use a model to explain why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. *Explain how a genetic mutation may impact the structure and function of an organism.*				8th - Rock	
MS-LS3-2. Develop and use a model to describe how asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. *Compare and contrast the outcomes of asexual and sexual reproduction.*				8th - Boulder	

MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. *Compare and contrast currently living species to each other, as well as to extinct species.*				8th - Boulder	
MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. *Use evidence to show that genetic variation may impact survival and reproduction of some members of a population.*				8th - Boulder	
~~MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.~~ ~~*Describe the pattern of changes of a specific trait in a population over time.*~~				~~8th- Butterfly~~	
MS-ESS1-1. Develop and use a model of the				Seasons (Boulder)	

Earth-Sun-moon system to describe the cyclic patterns of ~~lunar phases, eclipses of the Sun and moon, and~~ seasons. *Describe the cyclic patterns related to the Earth-Sun-moon system.*				Lunar Phases/Eclipses (Butterfly)	
MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.				8th - Boulder	
~~MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6 billion-year-old history.~~ ~~*Explain the history of the Earth using evidence found in rock layers.*~~					
MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying temporal and spatial scales. *Use evidence to explain how weathering, erosion, and deposition have shaped the surface of present-day Earth.*				6th - Rock 8th - Butterfly	
				8th - Boulder (with fossil unit)	

MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. *Describe the cycles of Earth's materials (rocks, minerals, etc) and the role that energy plays in these cycles.*				6- Potential Boulder	
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. *Describe the cycle of Earth's water and the role that energy plays in this cycle.*				6th - Boulder 8th - Rock	
~~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 geologic processes.~~ ~~*Explain how humans have impacted Earth's natural cycles by using Earth's natural resources.*~~					
MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.				6th - Boulder	

Describe how the movement and interaction of large amounts of air can lead to various weather conditions.					
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. *Explain how ocean and air movement are influenced by the unequal heating and rotation of Earth.*				6th - Boulder 7th - Rock	
MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. *Describe the factors that have caused a rise in global temperatures.*				6th-8th - Boulder	
MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impacts Earth's systems. *Explain how the increasing population has led to the use of more natural resources, which has impacted the Earth.*				6th-8th - Boulder	
MS-PS3-4 Plan and conduct an investigation to determine the relationships among the energy transferred, the type				7th - Boulder	

of matter, the mass, and the change in the temperature of the sample of matter.					
MS-PS1-8 Plan and conduct an investigation to demonstrate that mixtures are combinations of substances.				8th - Boulder	
MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms in a variety of ecosystems.				7th - Boulder	
MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.				7th - Boulder (environmental) 8th - Rock (genetic)	
~~MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment~~					
Science & Engineering Practices (SEPs)					
Asking Questions Develop testable questions by qualitatively and quantitatively observing phenomena/problems				6th-8th - Boulder	
Planning and Carrying Out Investigations Plan an investigation by describing variables, defining test groups and identifying measurements that will be taken and then carry out the investigation by following a				6th-8th - Boulder	

written procedure.					
Analyzing and Interpreting Data Construct and use graphical displays to provide evidence of phenomena.				6th-8th - Boulder	
Constructing Explanations Construct an explanation of phenomena that includes evidence gathered from both the investigation and reliable sources.				6th-8th - Boulder	
Obtaining, Evaluating, and Communicating Information Critically read and evaluate scientific texts and graphic representations (adapted for classroom use) to determine central ideas/findings, obtain scientific and/or technical information, describe patterns in and/or evidence about the natural/designed world, and/or determine credibility and bias.				6th-8th - Boulder	
Developing and Using Models Develop, use, evaluate, and/or revise a model to predict and/or describe phenomena by generating data based on defined inputs and outputs OR showing relationships between defined variables.				6th-8th - Boulder	