8th Grade Science Essential Standards & Learning Targets

1st Semester

S8P1d. Construct an argument based on observational evidence to support the claim that when a change in a substance occurs, it can be classified as either chemical or physical. (Clarification statement: Evidence could include ability to separate mixtures, development of a gas, formation of a precipitate, change in energy, color, and/or form.)

S8P1e. Develop models (e.g., atomic-level models, including drawings, and computer representations) by analyzing patterns within the periodic table that illustrate the structure, composition, and characteristics of atoms (protons, neutrons, and electrons) and simple molecules.

S8P2b. Plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g., roller coasters, pendulums, rubber bands).

S8P2d. Plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).

2nd Semester

S8P3a. Analyze and interpret data to identify patterns in the relationships between speed and distance, and velocity and acceleration. (*Clarification statement:* Students should be able to analyze motion graphs, but students should not be expected to calculate velocity or acceleration.)

S8P4a. Ask questions to develop explanations about the similarities and differences between electromagnetic and mechanical waves. (*Clarification statement:* Include transverse and longitudinal waves and wave parts such as crest, trough, compressions, and rarefactions.)

S8P4b. Construct an explanation using data to illustrate the relationship between the electromagnetic spectrum and energy.

S8P4d. Develop and use a model to compare and contrast how light and sound waves are reflected, refracted, absorbed, diffracted, or transmitted through various materials. (Clarification statement: Include echo and how color is seen but not interference and scattering.)

First Semester Learning Target

Prioritized Standard: S8P1d **Obtain, evaluate, and communicate information about the structure and properties of matter. Construct an argument to support the claim that when a change occurs it is either chemical or physical. (Clarification statement: Evidence could include ability to separate mixtures, development of a gas, formation of a precipitate, change in energy, color, and/or form.)**	
4	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. Learning Target 1: The student will ask questions and investigate real-world examples of physical and chemical changes such as baking. Include information about how the change demonstrates the law of conservation of matter

3	Learning Target 1: The student will construct an argument to support the claim that when a change occurs it is either physical or chemical The student exhibits no major errors or omissions.
2	There are no major errors or omissions regarding the simpler details and processes. Learning Target 1: The student will recognize or recall specific vocabulary: physical property, physical change, chemical property, chemical change, reactivity, combustibility, density, melting point, boiling point, precipitate Learning Target 2: The student will distinguish between physical and chemical properties Learning Target 3: The student will recognize indicators of physical and chemical changes Learning Target 4:The student will plan and carry out investigations to compare and contrast chemical and physical properties of matter (S8P1c) However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
1	With help, partial success at score 2.0

First Semester Learning Target

Prioritized Standard: S8P1e **Obtain, evaluate, and communicate information about the structure and properties of matter. Develop models (e.g., atomic-level models, including drawings, and computer representations) by analyzing patterns within the periodic table that illustrate the structure, composition, and characteristics of atoms (including protons, neutrons, and electrons) and simple molecules.**	
4	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. Learning Target 1: The student will ask questions and investigate real-world applications (such as medicines, tracers) of the use of isotopes Learning Target 2: The student will construct an explanation of how the structure, composition, and characteristics of matter influence the type of materials that would be suitable for certain applications such as materials engineering (Hardness, conductivity, etc.)
3	Learning Target 1: The student will develop models (e.g., atomic-level models, including drawings, and computer representations) by analyzing patterns within the periodic table that illustrate the structure, composition, and characteristics of atoms (including protons, neutrons, and electrons) and simple molecules The student exhibits no major errors or omissions.
2	There are no major errors or omissions regarding the simpler details and processes. Learning Target 1: The student will recognize or recall specific vocabulary: atomic number, atomic mass, groups, periods, protons, neutrons, electrons, element, periodic table, molecule

	Learning Target 2: The student will identify that the periodic table is arranged by increasing atomic number Learning Target 3: The student will recall or recognize the type of information that is included for each element in the periodic table (inside the element's box) Learning Target 4: The student will explain the relationships between elements in a group and between elements in a period Learning Target 5: The student will describe and explain the properties of different types of elements (metals, metalloids, non-metals) However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
1	With help, partial success at score 2.0

First Semester Learning Target

Prioritized Standard: S8P2b. **Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system. Plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g., roller coasters, pendulums, rubber bands).**	
4	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. Learning Target 1: The student will develop a scientific or mathematical model that demonstrates a system of energy and identify factors that affect potential and kinetic energy (identify energy transformations within the model)
3	Learning Target 1: The student will plan and carry out an investigation that demonstrates the transfer of energy that drives the motion or cycling of potential and kinetic energy within a system (e.g., roller coasters, pendulums, rubber bands) The student exhibits no major errors or omissions.
2	There are no major errors or omissions regarding the simpler details and processes. Learning Target 1: The student will recognize or recall specific vocabulary: potential energy, kinetic energy, gravitational potential energy, transformation, Law of Conservation of Energy Learning Target 2: The student will collect, display (as a graph or table), and analyze data that represents the relationship of kinetic energy to mass and speed Learning Target 3: The student will collect, display (as a graph or table), and analyze data that represents the relationship of potential energy to mass and height However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
1	With help, partial success at score 2.0

First Semester Learning Target

Prioritized Standard: S8P2d. **Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system. Plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction) or through space (radiation) or in currents in a liquid or a gas (convection).**	
4	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. Learning Target 1: The student will use a model to predict or describe natural phenomena related to heat transfer (i.e., Greenhouse Effect, Global Warming) and identify cause and effect relationships
3	Learning Target 1: The student will plan an investigation of the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction) or through space (radiation) or in currents in a liquid or a gas (convection) The student exhibits no major errors or omissions.
2	There are no major errors or omissions regarding the simpler details and processes. Learning Target 1: The student will recognize or recall specific vocabulary: convection, conduction, radiation, motion, thermal energy, heat transfer Learning Target 2: The student will identify and explain examples of conduction, convection, radiation Learning Target 3: The student will compare and contrast conduction, convection, radiation Learning Target 4: The student will develop and use a model to explain the movement of molecules that occurs in conduction, convection, and radiation However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
1	With help, partial success at score 2.0

Second Semester Learning Target

Prioritized Standard: S8P3a. **Obtain, evaluate, and communicate information about cause and effect relationships between force, mass, and the motion of objects. Analyze and interpret data to identify patterns in the relationships between speed and distance, and velocity and acceleration. (Clarification statement: Students should be able to analyze motion graphs, but students should not be expected to calculate changes in velocity or acceleration.)**	
4	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. Learning Target 1: The student will analyze and interpret data to ask questions that determine the relationships between speed, distance, velocity, and acceleration within real-world situations

3	Learning Target 1: The student will analyze and interpret motion graphs to identify patterns in the relationships between speed and distance, and velocity and acceleration The student exhibits no major errors or omissions.
2	There are no major errors or omissions regarding the simpler details and processes. Learning Target 1: The student will recognize or recall specific vocabulary: force, motion, speed, distance, velocity, acceleration, mass, weight, inertia Learning Target 2: The student will clarify the differences between speed, velocity, and acceleration Learning Target 3: The student will compare and contrast graphs of speed and distance and velocity and acceleration Learning Target 4: The student will explain the effect of force and mass on acceleration However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
1	With help, partial success at score 2.0

Second Semester Learning Target

Prioritized Standard: S8P4a

Obtain, evaluate, and communicate information to support the claim that electromagnetic (light) waves behave differently than mechanical (sound) waves. Ask questions to develop explanations about the similarities and differences between electromagnetic and mechanical waves. (Clarification statement: Include transverse and longitudinal waves and wave parts such as crest, trough, compressions, and rarefactions.)

4	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. Learning Target 1: The student will apply scientific knowledge of the properties of electromagnetic and mechanical waves to the real world scenarios. Research an application of waves and include benefits, risks, and current uses
3	Learning Target 1: The student will ask questions to develop explanations about the similarities and differences between electromagnetic and mechanical waves The student exhibits no major errors or omissions.
2	There are no major errors or omissions regarding the simpler details and processes. Learning Target 1: The student will recognize or recall specific vocabulary: electromagnetic waves, mechanical waves, transverse waves, longitudinal waves, medium, crest, trough, amplitude, wavelength, compression, refraction, rarefactions Learning Target 2: The student will identify the parts of transverse and longitudinal waves Learning Target 3: The student will explain the movement of transverse and longitudinal waves

	Learning Target 4: The student will categorize examples of electromagnetic and mechanical waves However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
1	With help, partial success at score 2.0

Second Semester Learning Target

Prioritized Standard: S8P4b. **Obtain, evaluate, and communicate information to support the claim that electromagnetic (light) waves behave differently than mechanical (sound) waves. Construct an explanation using data to illustrate the relationship between the electromagnetic spectrum and energy.**	
4	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. Learning Target 1: The student will construct an argument using evidence that supports or refutes the idea that electromagnetic waves are harmful to the human body and provide justification for the claim or argument. (Possible instructional tool is the C-E-R Framework)
3	Learning Target 1: The student will construct an explanation using data to explain the relationship between the electromagnetic spectrum and energy The student exhibits no major errors or omissions.
2	There are no major errors or omissions regarding the simpler details and processes. Learning Target 1: The student will recognize or recall specific vocabulary: electromagnetic spectrum, energy, frequency, wavelength, radio, ultraviolet, x-ray, infrared, microwaves, gamma rays, visible light Learning Target 2: The student will identify high energy EM waves and low energy EM waves when observing the EM spectrum Learning Target 3: The student will identify the levels of EM energy and relate them to real-world applications such as radio waves for cell phone transmission Learning Target 4: The student will explain the relationship between wave properties (frequency, amplitude, wavelength) and wave energy (S8P4f) However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
1	With help, partial success at score 2.0

Second Semester Learning Target

Prioritized Standard: S8P4d. **Obtain, evaluate, and communicate information to support the claim that electromagnetic (light) waves behave differently than mechanical (sound) waves. Develop and use a model to compare and contrast how light and sound waves are reflected, refracted, absorbed, diffracted, or transmitted**

through various materials. (Clarification statement: Include echo and how color is seen but not interference and scattering.)	
4	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. Learning Target 1: The student will investigate and communicate information about the Doppler Effect, Sonic Booms, and other phenomenon associated with waves Learning Target 2: The student will analyze data that is the result of the behavior of waves in various scientific fields and provide justification and reasoning to explain and interpret data
3	Learning Target 1: The student will develop and use a model to compare and contrast how light and sound waves are reflected, refracted, absorbed, diffracted, or transmitted through various materials The student exhibits no major errors or omissions.
2	There are no major errors or omissions regarding the simpler details and processes. Learning Target 1: The student will recognize or recall specific vocabulary: light wave, sound wave, refraction, reflection, diffraction, echo, medium, absorption, transmission Learning Target 2: The student will differentiate between light and sound waves Learning Target 3: The student will explain and/or illustrate reflection, refraction, absorbtion, diffraction or transmission of waves through various materials (S8P4e) However, the student exhibits major errors or omissions regarding the more complex ideas and processes.
1	With help, partial success at score 2.0