8th Grade Physical Science Power Standard Rubrics 3,2,1

Overall Scoring		
Mastery of Standard	**Approaching the Standard**	**Beginning to Learn**
Demonstrates mastery of individual goals.	Demonstrates partial mastery of individual goals.	Developing prerequisite skills for mastery of individual goals.

CHEMICAL REACTIONS- Physical Science Power Standards

Power Standard (Performance Expectation)	**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.**	
Learning Targets- Use from Units	I can describe how the total number of atoms does not change in a chemical reaction. I can develop, revise, and use a model to describe how mass is conserved.	
Common Misconceptions	Students may think that products are within the reactants themselves. Students may think the products are not entirely new. Students may have “magical thinking” about the formation of new products. Students may not know that minerals are made of one pure substance and think they are just rocks.	
Mastery of Standard	**Approaching the Standard**	**Beginning to Learn**
Student can develop a model that accurately demonstrates the formation of new substances from the combination and regrouping of atoms. Students can consistently identify that mass is conserved in the creation of new materials.	Students can develop a model but are missing components to accurately demonstrate the formation of new substances and inconsistently identifies that mass is conserved.	Students need support to develop a model and may think that the products of a reaction are not entirely new.
Previous Level	Chemical reactions that occur when substances are mixed can be identified by the emergence of substances with different properties; the total mass remains the same.	
Next Level	Chemical processes are understood in terms of collisions of molecules, rearrangements of atoms, and changes in energy as determined by properties of elements involved.	

STRUCTURE AND PROPERTIES OF MATTER- Physical Science Power Standards

Power Standard (Performance Expectation)	**PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.**	
Learning Targets- Use from Units	• I can develop models to describe simple molecules. • I can develop models to describe extended structures.	
Common Misconceptions	Students confuse atoms and molecules. Students confuse molecules and extended structures.	
Mastery of Standard	**Approaching the Standard**	**Beginning to Learn**
The student will develop models of simple molecules and extended structures. The student is able to describe the type and number of atoms in the models. The student can describe a structure as extended by describing the repeated pattern or crystal structure unlike a simple molecule.	The student can develop models of molecules, but is unable to accurately describe the type and number of atoms in the model. The student may or may not be able to identify an extended structure or a molecule.	The students is unable to develop models of molecules without support. The student is unable to identify differences between molecules and extended structures. Student may or may not be able to identify some of the atoms in the model.
Previous Level	Matter exists as particles that are too small to see and so matter is always conserved even if it seems to disappear. Measurements of a variety of observable properties can be used to identify particular materials.	
Next Level	The sub-atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.	

STRUCTURE AND PROPERTIES OF MATTER- Physical Science Power Standards

Power Standard (Performance Expectation)	**PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.**	
Learning Targets- Use from Units	• I can identify a pure substance. • I can develop a model that predicts and describes changes in particle motion as thermal energy is added or removed. • I can develop a model that predicts and describes changes of state as thermal energy is added or removed. • I can develop a model that predicts and describes changes in temperature as thermal energy is added or removed.	
Common Misconceptions	Students may confuse heat and thermal energy. Students may think heat is matter. Students think water vapor is visible. Students think particles in a solid are not in motion.	
Mastery of Standard	**Approaching the Standard**	**Beginning to Learn**
The student can identify a pure substance and create a model that shows the pure substance on a molecular level. The model includes changes in particle motion, changes of state, and change in temperature as thermal energy is added or removed.	The student can identify a pure substance and create a model that shows the pure substance on a molecular level. The model does not accurately represent the changes in particle motion, changes of state, and change in temperature as thermal energy is added or removed.	The student is unable to identify a pure substance and cannot create an accurate model.
Previous Level	Matter exists as particles that are too small to see and so matter is always conserved even if it seems to disappear. Measurements of a variety of observable properties can be used to identify particular materials.	
Next Level	The sub-atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.	

ENERGY- Physical Science Power Standards

Power Standard (Performance Expectation)	**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.**	
Learning Targets- Use from Units	• I can describe how distance between objects affects potential energy. • I can develop a model to describe potential energy.	
Common Misconceptions	Students do not understand what work is in scientific context. Students do not understand kinetic and potential energy are broader classifications of different types of energy. Students do not understand in order for work to be done the object must move in the same direction as the force. Students do not understand that gravitational potential energy of an object changes as its vertical height changes.	
Mastery of Standard	**Approaching the Standard**	**Beginning to Learn**
Students can develop a model to represent that objects at different heights have different amounts of potential energy. Students can explain how potential energy changes as height of an object changes.	Students can develop a model to represent that objects at different heights have different amounts of potential energy. Students can not explain how potential energy changes as height of an object changes.	Students cannot make a model to represent objects at different heights and they cannot explain any aspect of the model in terms of energy.
Previous Level	Moving objects contain energy. The faster the object moves, the more energy it has. Energy can be moved from place to place by moving objects, or through sound, light, or electrical currents. Energy can be converted from one form to another form.	
Next Level	The total energy within a system is conserved. Energy transfer within and between systems can be described and predicted in terms of energy associated with the motion or configuration of particles (objects).	

ENERGY- Physical Science Power Standards

Power Standard (Performance Expectation)	**PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.**	
Learning Targets- Use from Units	• I can plan an investigation to determine the effects of energy transfer, types of matter, and mass on temperature. • I can measure volume using various methods. • I can measure temperature in degrees celsius using a thermometer. • I can measure the mass of an object using a balance.	
Common Misconceptions	Students do not understand that particle motion results in temperature. Students think thermal energy can be transferred from cold to hot.	
Mastery of Standard	**Approaching the Standard**	**Beginning to Learn**
Students can plan an investigation in order to explain that as energy is transferred from one object to another the temperature will change. Students need to correctly identify what happens to the type of matter, the mass, and the change in the average kinetic energy as this temperature change takes place.	Students can plan an investigation in order to explain that as energy is transferred from one object to another the temperature will change. Students are unable to correctly identify what happens to the type of matter, the mass, and the change in the average kinetic energy as this temperature change takes place.	Students are unable to plan an investigation in order to explain that as energy is transferred from one object to another the temperature will change.
Previous Level	Moving objects contain energy. The faster the object moves, the more energy it has. Energy can be moved from place to place by moving objects, or through sound, light, or electrical currents. Energy can be converted from one form to another form.	
Next Level	The total energy within a system is conserved. Energy transfer within and between systems can be described and predicted in terms of energy associated with the motion or configuration of particles (objects).	

FORCES AND INTERACTIONS- Physical Science Power Standards

Power Standard (Performance Expectation)	**PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.**	
Learning Targets- Use from Units	• I can predict what will happen when two objects collide. • I can apply Newton's Third Law to a collision and explain the outcome. • I can design a solution to a problem with colliding objects.	
Common Misconceptions	Students think energy can disappear. Students fail to understand that objects push back against force.	
Mastery of Standard	**Approaching the Standard**	**Beginning to Learn**
Students can design a solution to a problem involving the motion of two colliding objects. Students can explain how Newton's Third Law applies to the collision.	Students can design a solution to a problem involving the motion of two colliding objects. Students are unable to explain how Newton's Third Law applies to the collision.	Students are unable to design a solution to a problem involving the motion of two colliding objects.
Previous Level	The effect of unbalanced forces on an object results in a change of motion. Patterns of motion can be used to predict future motion. Some forces act through contact, some forces act even when the objects are not in contact. The gravitational force of Earth action on an object near Earth's surface pulls that object toward the planet's center.	
Next Level	Newton's 2nd Law (F=ma) and the conservation of momentum can be used to predict changes in the motion of macroscopic objects. Forces at a distance are explained by fields that can transfer energy and can be described in terms of the arrangement and properties of the interacting objects and the distance between them. These forces can be used to describe the relationship between electrical and magnetic fields	

FORCES AND INTERACTIONS- Physical Science Power Standards

Power Standard (Performance Expectation)	**PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.**	
Learning Targets- Use from Units	• I can conduct an investigation to provide evidence that fields exist between objects exerting forces on each other, even though the objects are not in contact. • I can evaluate experimental designs.	
Common Misconceptions	Students may think that all metals are attracted to magnets. Students do not understand that magnets can act at a distance. Students do not understand that opposite charges attract to each other.	
Mastery of Standard	**Approaching the Standard**	**Beginning to Learn**
Students can conduct an investigation to provide evidence that fields exist between objects exerting forces on each other. Students can evaluate the experimental design and suggest improvements to the investigation.	Students can conduct an investigation to provide evidence that fields exist between objects exerting forces on each other. Students are unable to evaluate the experimental design and suggest improvements to the investigation.	Students cannot conduct the investigation. Students cannot evaluate the experimental design process. Students do not understand that forces can act at a distance.
Previous Level	The effect of unbalanced forces on an object results in a change of motion. Patterns of motion can be used to predict future motion. Some forces act through contact, some forces act even when the objects are not in contact. The gravitational force of Earth action on an object near Earth's surface pulls that object toward the planet's center.	
Next Level	Newton's 2nd Law (F=ma) and the conservation of momentum can be used to predict changes in the motion of macroscopic objects. Forces at a distance are explained by fields that can transfer energy and can be described in terms of the arrangement and properties of the interacting objects and the distance between them. These forces can be used to describe the relationship between electrical and magnetic fields.	

WAVES AND ELECTROMAGNETIC RADIATION- Physical Science Power Standards

Power Standard (Performance Expectation)	**PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.**	
Learning Targets- Use from Units	• I can develop a model to describe that waves are reflected, absorbed or transmitted through various materials. • I can use a model to describe that waves are reflected, absorbed or transmitted through various materials.	
Common Misconceptions	Students may not understand the features of waves depends on the medium. Students are unable to identify a medium. Students do not understand that white light is a combination of all the colors and black is the absence of all color. Students assume reflections only occur horizontally. Students don't understand that they're seeing reflected, not emitted, light.	
Mastery of Standard	**Approaching the Standard**	**Beginning to Learn**
Students can develop a model to describe and explain wave behavior including reflection, absorption, and transmission through various materials.	Students can develop a model to describe wave behavior that excludes or cannot explain either reflections, absorption, or transmission.	Students are unable to develop a model or cannot explain wave behavior.
Previous Level	Waves are regular patterns of motion, which can be made in water by disturbing the surface. Waves of the same type can differ in amplitude and wavelength. Waves can make objects move.	
Next Level	The wavelength and frequency of a wave are related to one another by the speed of the wave, which depends on the type of wave and the medium through which it is passing. Waves can be used to transmit information and energy.	