

# Unit Maps: Middle School Physical Science



Properties of Atoms, Elements, and Compounds	Unit	CHECKPOINT		
		1	2	3
<p><b>PS.3 Matter and energy.</b> The student knows that matter is composed of atoms and can differentiate elements and compounds.</p> <p>The student will explain what it means to say that God created the world and all matter out of nothing at a certain point in time; how it manifests His wisdom, glory, and purpose; and how He holds everything in existence according to His plan. *</p>				

Catholic Identity: Integration of Our Faith			
MS.1A	display a deep sense of wonder and delight about the natural universe *		
MS.1B	describe the unity of faith and reason *		
MS.1C	describe relationships, elements, underlying order, harmony, and meaning *		
MS.1D	share concern and care for the environment as part of God's creation *		

Learning Process Standards (Tools to Know)	Unit	CHECKPOINT		
		1	2	3
MS.2A plan and conduct investigations				
MS.2B collect information using appropriate scientific tools				

Content	Unit	CHECKPOINT		
		1	2	3
<b>Structure of Atoms</b>				
PS.3A describe the structure of atoms, including the masses, electrical charges, and locations, of protons and neutrons in the nucleus and electrons in the electron cloud				
PS.3A.1 identify that protons determine an element's identity and valence electrons determine its chemical properties, including reactivity				

<b>Periodic Table</b>				
PS.3B interpret the arrangement of the Periodic Table, including groups and periods, to explain how properties are used to classify elements				
PS.3B.1 know that an element is a pure substance represented by a chemical symbol and that a compound is a pure substance represented by a chemical formula				

<b>Atomic Composition of Molecules</b>				
PS.3C develop models to describe the atomic composition of simple molecules and extended structures.				

Learning Process Standards (Ways to Show)	Unit	CHECKPOINT		
		1	2	3
MS.2C record and organize data and observations				
MS.2D communicate observations about investigations				

# Unit Maps: Middle School Physical Science



Chemical Formulas, Equations, and Reactions	Unit	CHECKPOINT		
		1	2	3
PS.3 Matter and energy. The student knows that matter has chemical and physical properties.				

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Learning Process Standards (Tools to Know)	Unit	CHECKPOINT		
		1	2	3
MS.2A plan and conduct investigations				
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Content	Unit	CHECKPOINT		
		1	2	3
<b>Chemical Formulas</b>				
PS.3D recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts				

<b>Chemical Reactions</b>				
PS.3E investigate how evidence of chemical reactions indicates that new substances with different properties are formed and how that relates to the law of conservation of mass				
PS.3E.1 distinguish between physical and chemical changes in matter				
PS.3E.2 identify the formation of a new substance by using the evidence of a possible chemical change such as production of a gas, change in temperature, production of a precipitate, or color change				
PS.3E.3 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				

<b>Change in Particle Motion</b>				
PS.3F 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 Process Standards (Ways to Show)	Unit	CHECKPOINT		
		1	2	3
MS.2C record and organize data and observations				
MS.2D communicate observations about investigations				

# Unit Maps: Middle School Physical Science



Force, Motion, and Energy	Unit	CHECKPOINT		
		1	2	3
PS.4 Force, motion, and energy. The student knows that there is a relationship between force, motion, and energy.				

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Learning Process Standards (Tools to Know)	Unit	CHECKPOINT		
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Content	Unit	CHECKPOINT		
		1	2	3
<b>Motion</b>				
PS.4A investigate and describe applications of Newton's three laws of motion				
PS.4A.1 compare and contrast potential and kinetic energy				

<b>Force</b>				
PS.4B plan 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				
PS.4B.1 demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion				
PS.4B.2 differentiate between speed, velocity, and acceleration				
PS.4B.3 calculate average speed using distance and time measurements				
PS.4B.4 measure and graph changes in motion				
PS.4B.5 investigate how inclined planes can be used to change the amount of force to move an object				

<b>Newton's Third Law</b>				
PS.4C apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects				
PS.4C.1 identify and describe the changes in position, direction, and speed of an object when acted upon by unbalanced forces				

<b>Electric and Magnetic Forces</b>				
PS.4D ask questions about data to determine the factors that affect the strength of electric and magnetic forces				
PS.4D.1 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 Process Standards (Ways to Show)	Unit	CHECKPOINT		
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# Unit Maps: Middle School Physical Science



Law of Conservation of Energy	Unit	CHECKPOINT		
		1	2	3
<b>PS.4 Force, motion, and energy.</b> The student knows that the Law of Conservation of Energy states that energy can neither be created nor destroyed, it just changes form.				

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<b>Potential and Kinetic Energy</b>				
PS.4E 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				
PS.4E.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				

<b>Transfer of Energy</b>				
PS.4F apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer				
PS.4F.1 investigate methods of thermal energy transfer, including conduction, convection, and radiation				
PS.4F.2 verify through investigations that thermal energy moves in a predictable pattern from warmer to cooler until all the substances attain the same temperature such as an ice cube melting				
PS.4F.3 demonstrate energy transformations such as energy in a flashlight battery changes from chemical energy to electrical energy to light energy				

<b>Changes in Kinetic Energy</b>				
PS.4G construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object				

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# Unit Maps: Middle School Physical Science



Waves and their Application	Unit	CHECKPOINT		
		1	2	3
PS.4 Force, motion, and energy. The student knows the characteristics and behavior of waves.				

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		1	2	3
<b>Waves</b>				
PS.4H use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave				
PS.4H.1 develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials				

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