



InterActions in Physical Science Correlation to the Maryland Core Learning Goals

	Unit 1			Unit 2		Unit 3		Unit 4		Unit 5	Unit 6	Unit 7
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Standard 1- Skills and Processes – Students will demonstrate the thinking and acting inherent in the practice of science.												
A. Constructing Knowledge												
1. Design, analyze, or carry out simple investigations and formulate appropriate conclusions based on data obtained or provided.												
a. Explain that scientists differ greatly in what phenomena they study and how they go	XX	XX	X	X	X	X	X	X	X	X	XX	X
b. Develop the ability to clarify questions and direct them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
c. Explain and provide examples that all hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.	XX	XX	X	X	X	X	X	X	X	X	XX	XX
d. Locate information in reference books, back issues of newspapers, magazines and compact disks, and computer databases.		X	X	X	X	X	X	X	X	X	X	X
e. Explain that if more than one variable changes at the same time in an investigation, the outcome of the investigation may not be clearly attributable to any one of the variables.	XX	XX	XX	X	X	X	X	X	X	X	XX	XX
f. Give examples of when further studies of the question being investigated may be necessary.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
g. Give reasons for the importance of waiting until an investigation has been repeated many times before accepting the results as correct.	XX											
h. Use mathematics to interpret and communicate data.	XX	XX	XX	XX	X				X		X	
i. Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator’s credibility with other scientists and society.	XX	XX		X							X	X
B. Applying Evidence and Reasoning												
1. Review data from a simple experiment, summarize the data, and construct a logical argument about the cause-and-effect relationships in the experiment.												
a. Verify the idea that there is no fixed set of steps all scientists follow, scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence.	XX	XX									XX	XX
b. Explain that what people expect to observe often affects what they actually do observe and that scientists know about this danger to objectivity and take steps to try to avoid it when designing investigations and examining data.	XX	XX									XX	XX



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c. Explain that even though different explanations are given for the same evidence, it is not always possible to tell which one is correct.	XX	XX										XX	XX
d. Describe the reasoning that lead to the interpretation of data and conclusions drawn.	XX	XX	X	X	X	X	X	X	X	X	X	XX	XX
e. Question claims based on vague statements or on statements made by people outside their area of expertise.	X												
C. Communicating Scientific Information													
1. Develop explanations that explicitly link data from investigations conducted, selected readings and, when appropriate, contributions from historical discoveries.													
a. Organize and present data in tables and graphs and identify relationships they reveal.	XX	XX	XX	XX	X				X		X		
b. Interpret tables and graphs produced by others and describe in words the relationships they show.	X	X	X	X	X				X		X		
c. Give examples of how scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.	XX	XX	XX	X	X	X	X	X	X	X	XX	XX	
d. Criticize the reasoning in arguments in which Fact and opinion are intermingled Conclusions do not follow logically from the evidence given.	XX	X	X	X	X	X	X	XX	X	XX	X	X	
e. Explain how different models can be used to represent the same thing. What kind of a model to use and how complex it should be depend on its purpose. Choosing a useful model is one of the instances in which intuition and creativity come into play in science, mathematics, and engineering											X	X	X
f. Participate in group discussions on scientific topics by restating or summarizing accurately what others have said, asking for clarification or elaboration, and expressing alternative positions.	XX	XX	XX	X	X	X	X	X	X	X	XX	XX	X
g. Recognize that important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.	xx						X	X			X	XX	
D. Technology													
1. Explain that complex systems require control mechanisms.													
a. Explain that the choice of materials for a job depends on their properties and on how they interact with other materials.		X	XX								XX		



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b. Demonstrate that all control systems have inputs, outputs, and feedback.		XX		X	X	X	X		XX				
c. Realize that design usually requires taking constraints into account. (Some constraints, such as gravity or the properties of the materials to be used, are unavoidable. Other constraints, including economic, political, social, ethical, and aesthetic ones also limit choices.)	XX	XX		XX									
d. Identify reasons that systems fail—they have faulty or poorly matched parts, are used in ways that exceed what was intended by the design, or were poorly designed to begin with.	XX	XX		XX									
2. Analyze, design, assemble and troubleshoot complex systems.													
a. Provide evidence that a system can include processes as well as things.	XX	XX		XX									
b. Explain that thinking about things as systems means looking for how every part relates to others. (The output from one part of a system (which can include material, energy, or information) can become the input to other parts. Such feedback can serve to control what goes on in the system as a whole.)	X	X		XX	XX	X	X	XX	XX		X	X	
c. Analyze any system to determine its connection, both internally and externally to other systems and explain that a system may be thought of as containing subsystems and as being a subsystem of a larger system.	X	X		XX	XX	X	X	XX	XX		X	X	
3. Analyze the value and the limitations of different types of models in explaining real things and processes.													
a. Explain that the kind of model to use and how complex it should be depends on its purpose and that it is possible to have different models used to represent the same thing.											XX	XX	
b. Explain, using examples that models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or that are too vast to be changed deliberately, or that are potentially dangerous.											XX	XX	
c. Explain that models may sometimes mislead by suggesting characteristics that are not really shared with what is being modeled.											XX	XX	
Standard IV- Chemistry													
A. Structure of Matter													
1. Provide evidence to explain how compounds are produced.(No electron transfer)													



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a. Describe how elements form compounds and molecules.										X	XX	X
b. Investigate and describe what happens to the properties of elements when they react chemically with other elements.										X	X	XX
c. Based on data from investigations and research compare the properties of compounds with those of the elements from which they are made.			X							X	XX	X
B. Conservation of Matter												
1. Provide evidence to support the fact that the idea of atoms explains conservation of matter.												
a. Use appropriate tools to gather data and provide evidence that equal volumes of different substances usually have different masses.	XX						X			XX	X	X
b. Cite evidence from investigations that the total mass of a system remains the same throughout a chemical reaction because the number of atoms of each element remains the same.							XX			X	X	XX
c. Give reasons to justify the statement, "If the number of atoms stays the same no matter how the same atoms are rearranged, then their total mass stays the same."							XX			X	X	XX
C. States of Matter												
1. Describe how the motion of atoms and molecules in solids, liquids, and gases changes as heat energy is increased or decreased.												
a. Based on data from investigations and video technology, describe and give reasons for what happens to a sample of matter when heat energy is added to it								XX			XX	XX
b. Describe what the temperature of a solid, or a liquid, or a gas reveals about the motion of its atoms and molecules.								X			XX	XX
c. Formulate an explanation for the different characteristics and behaviors of solids, liquids, and gases using an analysis of the data gathered on the motion and arrangement of atoms and molecules.								X			XX	XX
D. Physical and Chemical Changes												
1. Compare compounds and mixtures based on data from investigations and research.												
a. Cite evidence from investigations to explain how the components of mixtures can be separated.										XX	X	X
b. Use evidence from data gathered to explain why the components of compounds cannot be separated using physical properties.										XX	X	X
c. Analyze the results of research completed to develop a comparison of compounds and mixtures.										XX	X	X



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2. Cite evidence and give examples of chemical properties of substances.												
a. Based on data from investigations and research, identify and describe chemical properties of common substances. Reacts with oxygen (rusting/tarnishing and burning) Reacts with acids Reacts with bases										X		XX
b. Use information gathered from investigations using indicators to classify materials as acidic, basic, or neutral.										XX		X
3. Provide evidence to support the fact that common substances have the ability to change into new substances.												
a. Investigate and describe the occurrence of chemical reactions using the following evidence: Color change Formation of a precipitate or gas Release of heat or light										X	X	XX
b. Use evidence from observations to identify and describe factors that influence reaction rates. Change in temperature Acidity									X	XX	X	XX
c. Identify the reactants and products involved in a chemical reaction given a symbolic equation, a word equation, or a description of the reaction.										X	X	XX
d. Provide data from investigations to support the fact that energy is transformed during chemical reactions.										X	X	XX
e. Provide examples to explain the difference between a physical change and a chemical change.										XX		X
Standard V- Physics												
A. Mechanics												
1. Develop an explanation of motion using the relationships among time, distance, velocity, and acceleration.												
a. Observe, describe, and compare the motions of objects using position, speed, velocity, and the direction.				XX	X	X	X					
b. Based on data given or collected, graph and calculate average speed using distance and time.				XX	X	X						



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c. Compare accelerated and constant motions using time, distance, and velocity.				XX	X	X	X					
d. Describe and calculate acceleration using change in the speed and time.				XX								
2. Identify and relate formal ideas (Newton's Laws) about the interaction of force and motion to real world experiences.												
a. Investigate and explain the interaction of force and motion that causes objects that are at rest to move.		X					XX	X				
b. Demonstrate and explain, through a variety of examples, that moving objects will stay in motion at the same speed and in the same direction unless acted on by an unbalanced force.		X					XX	XX				
c. Investigate and collect data from multiple trials, about the motion that explain the motion that results when the same force acts on objects of different mass; and when different amounts of force act on objects of the same mass.							XX	X				
d. Based on data collected and organized, explain qualitatively the relationship between net force applied to an object and its mass for a given acceleration.							XX	X				
e. Calculate the net force given the mass and acceleration.							XX	X				
3. Recognize and explain that every object exerts gravitational force on every other object.												
a. Explain the difference between mass and weight. Mass is a measure of inertia Weight is a measure of the force of gravity							X	XX				
b. Describe the relationship between the gravitational force and the masses of the attracting objects.								XX				
c. Describe the relationship between the gravitational force and the distance between the attracting objects.								XX				
d. Recognize and cite examples showing that mass remains the same in all locations while weight may vary with a change in location (weight on Earth compared to weight on moon).								XX				
e. Recognize that gravity is the force that holds planets, moons, and satellites in their orbits.								XX				
4. Recognize and explain that energy can neither be created nor destroyed; rather it changes form or is transferred through the action of forces.												



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a. Observe and describe the relationship between the distance an object is moved by a force and the change in its potential energy or kinetic energy, such as in a slingshot, in mechanical toys, the position of an object and its potential energy.					XX	X						
b. Identify the relationship between the amount of energy transferred (work) to the product of the applied force and the distance moved in the direction of that force.					XX	X						
c. Identify and describe that simple machines (levers and inclined planes) may reduce the amount of effort required to do work. Calculate input and output work using force and distance Demonstrate that input work is always greater than output work					XX							
B. Thermodynamics												
1. Describe and cite evidence that heat can be transferred by conduction, convection and radiation.												
a. Based on observable phenomena, identify and describe examples of heat being transferred through conduction and through convection.									XX		X	
b. Based on observable phenomena, identify examples to illustrate that radiation does not require matter to transfer heat energy.									XX			
c. Research and identify the types of insulators that best reduce heat loss through conduction, convection, or radiation.			X						XX			
2. Identify and explain that heat energy is a product of the conversion of one form of energy to another.												
1. Identify and describe the various forms of energy that are transformed in order for systems (living and non-living) to operate. Chemical - Flashlight-Light Mechanical - Pulleys-Motion Solar/Radiant - Solar calculator Chemical - Plant cells		X		X	XX				XX			
2. Explain that some heat energy is always lost from a system during energy transformations.	X	X		X	XX	X			XX		X	