

Course SPH6003
Name of Publisher Glencoe/McGraw-Hill
Title of Submission Physics: Principles and Problems
Author Zitzewitz, et al.
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ISBN 0078458137, STUDENT ED
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Content Area: Science
Grade/Course: SPH6003

Strand	The Scientific Process
Standard 1: The Scientific Process: SCIENTIFIC INVESTIGATION: Discover, invent, and investigate using the skills necessary to engage in the scientific process	

Topic	Scientific Inquiry			Page Reference
Benchmark SC.PS.1.1	Describe how a testable hypothesis may need to be revised to guide a scientific investigation			SE: 48-49, 136-137, 186-187, 246-247, 302-303, 420-421, 554-555, 632-633, 714-715, 790-791
Sample Performance Assessment (SPA)	The student: Describes a testable hypothesis and how it might be revised based on data from physical science investigations and primary sources (e.g., results, class data, information from a reputable source).			TWE: 48-49, 136-137, 186-187, 246-247, 302-303, 420-421, 554-555, 632-633, 714-715, 790-791
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Revise a testable hypothesis based on new data to guide a scientific investigation	Describe how a testable hypothesis may need to be revised to guide a scientific investigation	Give an example of one way to revise a testable hypothesis	Recognize that a hypothesis may need revision	

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Topic	Scientific Inquiry			Page Reference
Benchmark SC.PS.1.2	Design and safely implement an experiment, including the appropriate use of tools and techniques to organize, analyze, and validate data			SE: 20-21, 76-77, 108-109, 218-219, 332-333, 392-393, 474-475, 580-581, 606-607, 738-739
Sample Performance Assessment (SPA)	The student: Prepares a physical science lab report documenting the procedure(s) and the safe and appropriate use of tools (e.g., computer probes, meters, timers) and techniques (e.g., repeated trials, statistics, significant figures, spreadsheets, databases) to organize, analyze, and validate data.			TWE: 20-21, 76-77, 108-109, 218-219, 332-333, 392-393, 474-475, 580-581, 606-607, 738-739
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Report thoroughly the significant and other relevant details related to the design selected for an experiment, including the safe and appropriate use of tools and techniques to organize, analyze, and validate data	Report the significant details related to the design selected for an experiment, including the safe and appropriate use of tools and techniques to organize, analyze, and validate data	Report some details related to the design selected for an experiment, including the safe and appropriate use of tools and techniques to organize, analyze, and validate data	Report very few details related to the design selected for an experiment, including the safe and appropriate use of tools and techniques to organize, analyze, and validate data	

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Topic	Scientific Inquiry			Page Reference
Benchmark SC.PS.1.3	Defend and support conclusions, explanations, and arguments based on logic, scientific knowledge, and evidence from data			SE: 20-21, 48-49, 136-137, 218-219, 274-275, 474-475, 532-533, 660-661, 714-715, 738-739
Sample Performance Assessment (SPA)	The student: Prepares a physical science lab report that draws logical conclusions and formulates explanations and arguments from the results of investigations.			TWE: 20-21, 48-49, 136-137, 218-219, 274-275, 474-475, 532-533, 660-661, 714-715, 738-739
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Defend conclusions, explanations, and arguments that are supported by logic, scientific knowledge, and evidence from data and suggest implications	Defend conclusions, explanations, and arguments that are supported by logic, scientific knowledge, and evidence from data	Present conclusions, explanations, and arguments that are partially supported by logic, scientific knowledge, or evidence from data	Present unsupported conclusions, explanations, and arguments	

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Topic	Scientific Inquiry			Page Reference
Benchmark SC.PS.1.4	Determine the connection(s) among hypotheses, scientific evidence, and conclusions			SE: 76-77, 160-161, 218-219, 332-333, 392-393, 504-505, 554-555, 606-607, 632-633, 686-687, 824-825
Sample Performance Assessment (SPA)	The student: Prepares a physical science lab report that supports or refutes a hypothesis based on an analysis of experimental data.			TWE: 76-77, 160-161, 218-219, 332-333, 392-393, 504-505, 554-555, 606-607, 632-633, 686-687, 824-825
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Determine and justify logical connection(s) and implications among hypotheses, scientific evidence, and conclusions	Determine logical connection(s) among hypotheses, scientific evidence, and conclusions	Identify some connections between hypotheses, scientific evidence, or conclusions	Make unsubstantiated connection(s) among hypotheses, scientific evidence, and conclusions	

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Topic	Scientific Inquiry			Page Reference
Benchmark SC.PS.1.5	Communicate the components of a scientific investigation, using appropriate techniques			SE: 20-21, 76-77, 108-109, 246-247
Sample Performance Assessment (SPA)	The student: Presents the question, testable hypothesis, experimental design, analysis of data, and conclusions to the physical science class using appropriate methods of communication (e.g., PowerPoint, essay, oral presentation, poster board, lab report, research paper).			TWE: 20-21, 76-77, 108-109, 246-247
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Consistently present, in detail, all components of a scientific investigation, using appropriate techniques	Usually present all components of a scientific investigation, using appropriate techniques	Sometimes present the components of a scientific investigation, using appropriate techniques	Rarely present the components of a scientific investigation	

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Topic	Scientific Inquiry			Page Reference
Benchmark SC.PS.1.6	Engage in and explain the importance of peer review in science			SE: 20-21, 76-77, 108-109, 246-247
Sample Performance Assessment (SPA)	The student: Examines a peer's physical science investigation for logic and validity based on evidence. Explains the importance of peer review to the process of scientific inquiry.			TWE: 20-21, 76-77, 108-109, 246-247
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Effectively participate in peer review. Explain the principal and other relevant reasons for peer review in science	Engage actively in peer review. Explain the principal reasons for peer review in science.	Participate in peer review. Explain some reasons for peer review in science	Participate in peer review. Not able to explain the reasons for peer review in science	

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Topic	Scientific Knowledge			Page Reference
Benchmark SC.PS.1.7	Revise, as needed, conclusions and explanations based on new evidence			SE: 119, 197, 257, 313, 375, 431, 485, 541, 671, 747
Sample Performance Assessment (SPA)	The student: Reflects on new physical science evidence from other valid sources and revises conclusion and explanations as needed. Includes recommendations for improving the investigation.			TWE: 119, 197, 257, 313, 375, 431, 485, 541, 671, 747
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Revise and justify conclusions and explanations logically, based on new evidence	Revise conclusions and explanations logically, based on new evidence	Make few revisions to conclusions and explanations partially based on new evidence	Make very few revisions to conclusions and explanations	

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Topic	Scientific Knowledge			Page Reference
Benchmark SC.PS.1.8	Describe the importance of ethics and integrity in scientific investigation			This objective falls outside the scope of <i>Physics: Principles and Problems</i> .
Sample Performance Assessment (SPA)	The student: Identifies and describes physical science examples of ethical and unethical experimentation, citation, and conclusions (e.g., provides guidelines concerning the appropriate treatment of living things and the environment; credits sources; reduces bias; sometimes adds constraints).			
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Explain and give examples of the principal and other relevant reasons for ethics and integrity in scientific investigation	Describe the principal reasons for ethics and integrity in scientific investigation	Describe some reasons for ethics and integrity in scientific investigation	Describe very few reasons for ethics and integrity in scientific investigation	

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Topic	Scientific Knowledge			Page Reference
Benchmark SC.PS.1.9	Explain how scientific explanations must meet a set of established criteria to be			This objective falls outside the scope of <i>Physics: Principles and Problems</i> .
Sample Performance Assessment (SPA)	The student: Describes how a published study meets the criteria of scientific explanations (e.g., they must be consistent with experimental and observational evidence about nature, make accurate predictions about systems being studied, be logical, abide by the rules of evidence, be open to questions and modifications, be based on historical and current scientific knowledge, and make a commitment to making the knowledge public) in order to draw conclusions about the study's validity.			
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Analyze a scientific explanation to determine if it meets a set of established criteria	Explain how a set of established criteria must be met for scientific explanations to be considered valid	Explain some of the criteria used to evaluate scientific explanations	Attempt to explain how scientific explanations must meet a set of established criteria to be considered valid	

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Strand	The Scientific Process
Standard 2: The Scientific Process: NATURE OF SCIENCE: Understand that science, technology, and society	

Topic	Science, Technology, and Society			Page Reference
Benchmark SC.PS.2.1	Explain how scientific advancements and emerging technologies have influenced society			SE: 162, 220, 248, 304, 394, 450, 476, 608, 716, 826
Sample Performance Assessment (SPA)	The student: Describes a current scientific advancement or emerging technology, lists its key features and uses, and its possible impact on society (e.g., transportation, communication).			TWE: 162, 220, 248, 304, 394, 450, 476, 608, 716, 826
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Evaluate a current scientific advancement or emerging technology and predict its influence on society	Explain how scientific advancements and emerging technologies have influenced society	Provide examples of the ways scientific advancements and emerging technologies have influenced society	Recognize that science and technology have influenced society	

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Topic	Science, Technology, and Society			Page Reference
Benchmark SC.PS.2.2	Compare the risks and benefits of potential solutions to technological issues			This objective falls outside the scope of <i>Physics: Principles and Problems</i> .
Sample Performance Assessment (SPA)	The student: Compares risks and benefits (e.g., in terms of the impact on populations, resources, health, disease, environment) of alternative solutions to a specific current technological issue (e.g., alternative energy).			
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Analyze the risks and benefits of potential solutions to technological issues and support that perspective	Compare the risks and benefits of potential solutions to technological issues	Describe the risks and benefits of potential solutions to technological issues	List risks and benefits of potential solutions to technological issues	

Strand	Life and Environmental Sciences
Standard 3: Life and Environmental Sciences: ORGANISMS AND THE ENVIRONMENT: Understand the unity,	

There are no benchmarks for this standard for this Grade/Course.

Strand	Life and Environmental Sciences
Standard 4: Life and Environmental Sciences: STRUCTURE AND FUNCTION IN ORGANISMS: Understand the	

There are no benchmarks for this standard for this Grade/Course.

Strand	Life and Environmental Sciences
Standard 5: Life and Environmental Sciences: DIVERSITY, GENETICS, AND EVOLUTION: Understand	

There are no benchmarks for this standard for this Grade/Course.

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Strand	Physical, Earth, and Space Sciences
Standard 6: Physical, Earth and Space Science: NATURE OF MATTER AND ENERGY: Understand the nature	

Topic	Energy and its Transformation			Page Reference
Benchmark SC.PS.6.1	Describe endothermic and exothermic chemical reactions			This objective falls outside the scope of <i>Physics: Principles and Problems</i> .
Sample Performance Assessment (SPA)	The student: Gives examples of endothermic and exothermic reactions (e.g., cold pack and hot pack).			
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Compare and give examples of endothermic and exothermic reactions	Describe endothermic and exothermic chemical reactions	Give examples of endothermic and exothermic chemical reactions	Recognize an endothermic or exothermic chemical reaction	

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Topic	Energy and its Transformation			Page Reference
Benchmark SC.PS.6.2	Explain how the law of conservation of energy is applied to various systems			SE: 293-303
Sample Performance Assessment (SPA)	The student: Explains how the law of conservation of energy describes the dynamics of various systems (e.g., work, thermal, electrical, potential and kinetic energy).			TWE: 293-303
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Use the law of conservation of energy to explain how energy systems are interrelated	Explain the law of conservation of energy and how it is applied to various systems	Provide examples of the law of conservation of energy and how it is applied to various systems	Define the law of conservation of energy	

Topic	Energy and its Transformation			Page Reference
Benchmark SC.PS.6.3	Describe different examples of the concept of entropy			SE: 328-331
Sample Performance Assessment (SPA)	The student: Describes different examples of the flow of energy coming from an energy source, demonstrating that while the total energy of the universe remains constant, matter tends to become steadily less ordered as various energy transfers occur.			TWE: 328-331
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Explain examples of the concept of entropy and describe the flow of energy in each	Describe different examples of the concept of entropy	Recall examples of the concept of entropy	State the concept of entropy	

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Topic	Energy and its Transformation			Page Reference
Benchmark SC.PS.6.4	Explain that changes in thermal energy can lead to a phase change of matter			SE: 314-315
Sample Performance Assessment (SPA)	The student: Describes that thermal energy exists in the random motion of atoms and molecules (e.g., the greater the temperature, the greater the atomic or molecular motion) and explains why temperature remains constant during phase changes.			TWE: 314-315
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Compare and explain the phases of matter and describe how thermal energies change, but the temperature remains constant during phase changes	Explain the phases of matter as differences in energy and that a change in thermal energy can lead to a phase change	Describe the phases of matter as differences in energy or that a change in thermal energy can lead to a phase change	List the phases of matter and recognize that the relative thermal energies are different	

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Topic	Waves			Page Reference
Benchmark SC.PS.6.5	Compare transverse and longitudinal waves and their properties			SE: 381
Sample Performance Assessment (SPA)	The student: Compares the properties of transverse waves with those of longitudinal waves and discusses how these properties can model different wave phenomenon such as sound, mechanical, and electromagnetic waves (e.g., radio waves, visual light).			TWE: 381
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Compare transverse and longitudinal waves and their properties and apply them to real world phenomena	Compare transverse and longitudinal waves and their properties	Describe the properties of transverse and longitudinal waves	Provide examples of transverse and longitudinal waves	

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Topic	Waves			Page Reference
Benchmark SC.PS.6.6	Explain and provide examples of electromagnetic radiation and sound using a wave model			SE: 382-383, 387-389, 390-391
Sample Performance Assessment (SPA)	The student: Applies the principles of wave behavior to explain observed phenomena involving electromagnetic radiation and sound (e.g., why students talking in a classroom sound louder than in an open field).			TWE: 382-383, 387-389, 390-391
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Explain and provide examples of electromagnetic radiation and sound using a wave model and apply the wave model to describe an observed phenomenon	Explain and provide examples of electromagnetic radiation and sound using a wave model	Provide examples of electromagnetic radiation and sound or describe a wave model	Define electromagnetic radiation and sound	

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Topic	Nature of Matter			Page Reference
Benchmark SC.PS.6.7	Explain how elements are arranged in the periodic table and describe trends among elemental properties			This objective falls outside the scope of <i>Physics: Principles and Problems</i> .
Sample Performance Assessment (SPA)	The student: Explains the arrangement of elements on the periodic table and the repeating patterns that occur in the periodic table among elements with similar properties.			
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Compare how elements are arranged in the periodic table and analyze trends among elemental properties	Explain how elements are arranged in the periodic table and describe trends among elemental properties	Describe how elements are arranged in the periodic table	Recall some patterns of elements on the periodic table	

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Topic		Nature of Matter		Page Reference
Benchmark SC.PS.6.8		Describe interactions among molecules		This objective falls outside the scope of <i>Physics: Principles and Problems</i> .
Sample Performance Assessment (SPA)		The student: Explains interactions among molecules (e.g., electrical forces, van der Waals forces, hydrogen bonds) and their relationship to the physical properties of compounds.		
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Compare interactions among molecules	Describe interactions among molecules	Provide examples of interactions among molecules	List types of interactions among molecules	

Topic		Nature of Matter		Page Reference
Benchmark SC.PS.6.9		Describe the factors that affect the rate of chemical reactions		This objective falls outside the scope of <i>Physics: Principles and Problems</i> .
Sample Performance Assessment (SPA)		The student: Describes the effects of temperature, concentration, physical state, and catalysts on the rate of a chemical reaction.		
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Predict how a combination of factors will affect the rate of chemical reactions	Describe the factors that affect the rate of chemical reactions	Describe some of the factors that affect the rate of chemical reactions	List factors that affect the rate of chemical reactions	

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Topic		Nature of Matter		Page Reference
Benchmark SC.PS.6.10		Explain how atoms bond using valence electrons		This objective falls outside the scope of <i>Physics: Principles and Problems</i> .
Sample Performance Assessment (SPA)		The student: Explains how valence electrons are shared or exchanged during chemical bond formation.		
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Compare and provide examples of chemical bond formations and the role of valence electrons	Explain how atoms bond using valence electrons	List ways that atoms may be bonded	Recognize that atoms may be bonded by gaining, losing, or sharing valence electrons	

Topic		Nature of Matter		Page Reference
Benchmark SC.PS.6.11		Describe a variety of chemical reactions		This objective falls outside the scope of <i>Physics: Principles and Problems</i> .
Sample Performance Assessment (SPA)		The student: Uses chemical formulas and balanced equations to describe a variety of chemical reactions (e.g., synthesis, decomposition, replacement).		
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Predict the products, balance the equations, and classify the types of chemical reactions	Describe a variety of chemical reactions using chemical formulas and balanced equations	Identify simple chemical reactions using chemical formulas and balanced equations	Recall a variety of chemical reactions	

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Topic	Energy and its Transformation			Page Reference
Benchmark SC.PS.6.12	Describe nuclear reactions and how they produce energy			SE: 811-812, 813-814, 826
Sample Performance Assessment (SPA)	The student: Describes ways energy is produced by nuclear reactions (e.g., decay, fusion and fission).			TWE: 811-812, 813-814, 826
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Explain ways that nuclear energy is produced and used	Describe nuclear reactions and how they produce energy	Provide examples of energy production in a nuclear reaction	Recall that nuclear reactions convert a fraction of the mass of interacting particles into energy	

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Strand	Physical, Earth, and Space Sciences
Standard 7: Physical, Earth, and Space Sciences: FORCE AND MOTION: Understand the relationship	

Topic	Forces and Motion			Page Reference
Benchmark SC.PS.7.1	Apply the laws of motion to determine the effects of forces on the linear motion of			SE: 94-99, 100-103, 155, 182, 208-209, 754-755
Sample Performance Assessment (SPA)	The student: Illustrates Newton's laws of motion by analyzing and solving simple problems related to force and motion.			TWE: 94-99, 100-103, 155, 182, 208-209, 754-755
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Use the laws of motion to analyze or predict events in the environment	Apply the laws of motion to determine the effects of forces on the linear motion of objects	Provide examples of how the laws of motion affect the linear motion of objects	List the laws of motion	

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Topic		Forces and Motion		Page Reference
Benchmark SC.PS.7.2		Use vectors to explain force and motion		SE: 35-37, 119-125, 131
Sample Performance Assessment (SPA)		The student: Solves force and motion vector problems graphically.		TWE: 35-37, 119-125, 131
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Construct and use vectors to solve force and motion problems	Use vectors to explain force and motion	Given force vectors, explain force and motion	Recognize that vectors describe magnitude and direction of forces or motion	

Topic		Forces of the Universe		Page Reference
Benchmark SC.PS.7.3		Explain the relationship among the gravitational force, the mass of the objects, and the		SE: 175-178
Sample Performance Assessment (SPA)		The student: Describes what happens to the magnitude of the gravitational force as distance between and/or masses of the objects change.		TWE: 175-178
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Mathematically explain the effect of changing mass and changing distance on the gravitational force	Explain the relationship among the gravitational force, the mass of the objects, and the distance between objects	Describe the effect of changing mass and changing distance on the gravitational force	Recognize that the gravitational force is dependent on the masses of the objects and the distance between them	

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Topic	Forces of the Universe			Page Reference
Benchmark SC.PS.7.4	Explain the magnetic and electric forces in the universe			SE: 88, 541, 546-553, 652-653, 657-658
Sample Performance Assessment (SPA)	The student: Describes the magnetic and electric forces in the universe.			TWE: 88, 541, 546-553, 652-653, 657-658
Rubric				
Advanced	Proficient	Partially Proficient	Novice	
Compare and explain how magnetic forces are closely related to electric forces	Explain how magnetic forces are closely related to electric forces	Describe that magnetic forces are closely related to electric forces	Recognize that magnetic forces are closely related to electric forces	

Strand	Physical, Earth, and Space Sciences
Standard 8: Physical, Earth, and Space Sciences: EARTH AND SPACE SCIENCE: Understand the Earth and	

There are no benchmarks for this standard for this Grade/Course.