Physical Science

Curriculum Guide

Scranton School District

Scranton, PA



Physical Science

Prerequisite:

- Successful completion of general science and biology courses.
- Students should also possess solid math skills.

Physical Science provides a basic understanding of physics and chemistry related concepts. Students learn to develop problem solving skills and strategies that are related to students' interests and that address everyday problems. Topics include, but are not limited to: introductory science skills and concepts, properties of matter, atoms and molecules, chemical elements, chemical reactions, Newton's Laws, motion and force, work, energy and momentum, and thermodynamics. These areas require a limited amount of mathematics. Although Physical Science is not a laboratory course, some exploratory activities are used.

Year-at-a-glance

Subject: Physical Science	Grade Level: 11/12	Date Completed: 7-7-15

1st Quarter

Торіс	Resources	Academic Standards
Introduction to Science	Approved textbook	3.2.12.B7
		3.2.10.A6
		CC.3.5
		CC.3.6
Newton's Laws of Motion	Approved textbook	3.2.12.B7
		3.2.10.B1
		3.2.12.B2
		CC.3.5
		CC.3.6
Work and Energy	Approved textbook	3.2.12.B7
		3.2.10.B2
		3.2.12.B6
		CC.3.5
		CC.3.6

2nd Quarter

Торіс	Resources	Academic Standards
Gravity and Projectile Motion	Approved textbook	3.2.12.B7
		3.2.12.B4
		3.2.12.B6
		CC.3.5
		CC.3.6
Thermodynamics	Approved textbook	3.2.12.B7
		3.2.10.B3
		3.2.10.A3
		3.2.12.B3
		CC.3.5
		CC.3.6
Electricity and Magnetism	Approved textbook	3.2.12.B7
		3.2.10.B4
		3.2.12.B4
		CC.3.5
		CC.3.6
Waves – Sound and Light	Approved textbook	3.2.12.B7
		3.2.10.B5
		CC.3.5
		CC.3.6

3rd Quarter

Торіс	Resources	Academic Standards
Atoms and the Periodic Table	Approved textbook	3.2.C.A6
		3.2.10.A1
		3.2.10.A5
		3.2.12.A2
		CC.3.5
		CC.3.6
Chemical Bonding and Reactions	Approved textbook	3.2.C.A6
		3.2.10.A2
		3.2.10.A4
		CC.3.5
		CC.3.6
Radioactivity	Approved textbook	3.2.C.A6
		3.2.12.A2
		CC.3.5
		CC.3.6

4th Quarter

Торіс	Resources	Academic Standards
Nuclear Fission and Fusion	Approved textbook	3.2.C.A6
		3.2.12.A3
		CC.3.5
		CC.3.6
Mixtures	Approved textbook	3.2.C.A6
		3.2.12.A1
		CC.3.5
		CC.3.6
Acids and Bases/Oxidation and Reduction	Approved textbook	3.2.C.A6
		3.2.12.A4
		CC.3.5
		CC.3.6
Optional: Earth and Space Science topics as time allows	Approved textbook	
Final Exam Review		

General Topic	Academic	Essential Knowledge,	Resources &	Assessments	Suggested Time
	Standard(s)	Skills & Vocabulary	Activities		
Introduction to	3.2.10.A6	Compare and contrast scientific theories.	Approved	Teacher	10 days
Science		Know that both direct and indirect observations are used by scientists to study the natural world and universe.	text book <u>Conceptual</u>	prepared tests, quizzes, etc.	
		Identify questions and concepts that guide scientific investigations.	Physical Science	Available	
		Formulate and revise explanations and models using logic and evidence.	Explorations: Chapter 1 Resource Guide	Available online assessments	
		Recognize and analyze alternative explanations and models.	Calculators	(optional)	
		Explain the importance of accuracy and precision in making valid measurements.	Measurement Lab	Teacher prepared lab	
	CC.3.5	Reading information Text – Students read, understand, and respond to informational text – with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence.	Activity	activities	
	CC.3.6	Writing – Students write for different purposes and audiences. Students write clear and focused text to convey a well defined perspective and appropriate content.			
	3.2.12.B7	Examine the status of existing theories.			
		Evaluate experimental information for relevance and adherence to science processes.			
		Judge that conclusions are consistent and logical with experimental conditions.			
		Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.			
		Communicate and defend a scientific argument.			
		(Use with all Physics topics)			

Newton's Laws	3.2.10.B1	Analyze the relationships among the net forces acting on	Approved	20 days
of Motion		a body, the mass of the body, and the resulting	textbook	
		acceleration using Newton's Second Law of Motion.		
			Conceptual	
		Apply Newton's Law of Universal Gravitation to the	Physical science	
		forces between two objects.	Explorations:	
			Chapters 2, 3, 4	
		Use Newton's Third Law to explain forces as interactions	and Resource	
		between bodies.	Guides	
		Describe how interactions between objects conserve	Calculators	
		momentum.		
			Newton's Law Lab	
		Explain how energy flowing through an open system can	Activities	
		be lost.		
			Teacher	
		Demonstrate how the law of conservation of momentum	demonstrations	
	3.2.12.B2	and conservation of energy provide alternate approaches	ucinonstrutions	
		to predict and describe the motion of objects.		
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		Explain how energy flowing through an open system can		
		be lost.		
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		and conservation of energy provide alternate approaches		
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		Use Newton's Third Law to explain forces as interactions		
		between bodies.		
		Describe how interactions between objects conserve		
		momentum		
	CC.3.5	Reading Informational Text		
	CC.3.6	Writing		

Work and Energy	3.2.10.B2	Explain how the overall energy flowing through a system remains constant.	Approved text book	15 days
		Describe the work-energy theorem.	<u>Conceptual</u>	
		Explain the relationships between work and power.	Physical Science Explorations:	
	3.2.12.B6	Explain how the behavior of matter and energy follow predictable patterns that are defined by laws.	Chapter 6 Resource Guides	
	CC.3.5	Reading Informational Text	Calculators	
	CC.3.6	Writing	Work and Power	
			Lab Activity	
			Teacher	
			demonstrations	

Gravity and Projectile Motion	3.2.12.B4	Describe conceptually, the attractive and repulsive forces between objects relative to their charges and the	Approved textbook	10 days
		distance between them.	lexibook	
			<u>Conceptual</u>	
			Physical Science	
			Explorations:	
	3.2.12.B6	Compare and contrast motions of objects using forces	Chapters 6-7	
		and conservation laws.	Resource Guides	
			Lab Activities	
	CC.3.5	Reading Informational Text		
			Teacher	
	CC.3.6	Writing	demonstrations	

Thermodynamics	3.2.10.B3	Explain how heat energy will move from a higher temperature to a lower temperature until equilibrium is	Approved textbook	15 days
		reached.	<u>Conceptual</u>	
		Analyze the processes of convection, conduction, and	Physical Science	
		radiation between objects or regions that are at different temperatures.	Explorations: Chapters 9 and 10	
			Resource Guides	
	3.2.12.B3	Describe the relationship between the average kinetic		
		molecular energy, temperature, and phase changes.	Calculators	
			Teacher	
			demonstrations	
	3.2.10.A3	Describe phases of matter according to the kinetic molecular theory.		
	CC.3.5	Reading Informational Text		
	CC.3.6	Writing		

Electricity and	3.2.10.B4	Describe quantitatively the relationships between	Approved	10 days
Magnetism		voltage, current, and resistance to electrical energy and power.	textbook	
			<u>Conceptual</u>	
		Describe the relationship between electricity and	Physical Science	
		magnetism as two aspects of a single electromagnetic	Explorations:	
		force.	Chapters 11 and	
			12 Resource	
	2 2 4 2 5 4		Guide	
	3.2.12.B4	Describe conceptually the attractive and repulsive forces	Calculators	
		between objects relative to their charges and the distance between them.	Calculators	
		distance between them.	Circuits and	
			Magnetism Lab	
	CC.3.5	Reading information Text	Activities	
	CC.3.6	Writing	Teacher	
			demonstrations	

Waves – Sound	3.2.10.B5	Understand that waves transfer energy without	Approved	10 days
and Light		transferring matter.	textbook	
		Compare and contrast the wave nature of light and	Conceptual	
		sound.	Physical Science	
			Explorations:	
		Describe the components of the electromagnetic	Chapters 13-16	
		spectrum.	Resource Guide	
		Describe the difference between sound and light waves.	Calculators	
	CC.3.5	Reading Informational Text	Wave Lab Activity	
	CC.3.6	Writing	Teacher	
			demonstrations	

Atoms and the	3.2.10.A1	Predict properties of elements using periodic table	Approved	15 days
Periodic Table		trends.	textbook	
		Explain the unique properties of water (polarity, high	Conceptual	
		boiling point, forms hydrogen bonds, high specific heat)	Physical Science	
		that support life on Earth.	Explorations:	
			Chapters 17 and	
		Identify properties of matter that depend on sample size.	18 Resource	
			Guide	
	3.2.10.A5	Models: Describe the historical development of models		
		of the atom and how they contributed to modern atomic theory.	Calculators	
			Periodic Tables	
	3.2.12.A2	Distinguish among the isotopic forms of elements.		
			Constructing	
		Explain the probabilistic nature of radioactive decay	Atomic Models	
		based on subatomic rearrangement in the atomic nucleus.	Lab Activity	
		Explain how light is absorbed or emitted by electron orbital transitions.		
	CC.3.5	Reading Informational Text		
	CC.3.6	Writing		

3.2.C.A6	Compare and contrast scientific theories.		
	Know that both direct and indirect observations are used		
	by scientists to study the natural world and universe.		
	Identify questions and concepts that guide scientific investigations.		
	Formulate and revise explanations and models using logic and evidence.		
	Recognize and analyze alternative explanations and models.		
	Explain the importance of accuracy and precision in making valid measurements.		
	Examine the status of existing theories.		
	Evaluate experimental information for relevance and adherence to science processes.		
	Judge that conclusions are consistent and logical with experimental conditions.		
	Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.		
	Communicate and defend a scientific argument.		
	(Use with all Chemistry topics)		

Chemical	3.2.10.A2	Compare and contrast different bond types that result in	Approved	15 days
Bonding and		the formation of molecules and compounds.	textbook	
Reactions				
		Explain why compounds are composed of integer ratios	Conceptual	
		of elements.	Physical Science	
		Describe described as estimation to make of standing	Explorations:	
		Describe chemical reactions in terms of atomic	Chapter 23 Resource Guide	
		rearrangement and/or electron transfer.	Resource Guide	
	3.2.10.A4	Explain the difference between exothermic and	Lab Activities	
		endothermic reactions.	Bonding	
		Identify the factors that affect the rates of reactions.		
	CC.3.5	Reading Informational Text		
	CC.3.6	Writing		

Radioactivity	3.2.12.A2	Distinguish among the isotopic forms of elements.	Approved	15 days
			textbook	
		Explain the probabilistic nature of radioactive decay		
		based on subatomic rearrangement in the atomic	<u>Conceptual</u>	
		nucleus.	Physical Science	
			Explorations:	
	CC.3.5	Reading information Text	Chapter 19	
			Resource Guide	
	CC.3.6	Writing		
			Calculators	
			Half Life Lab	
			Activities	

Nuclear Fission and Fusion	3.2.12.A3	Explain how matter is transformed into energy in nuclear reactions according to the equation $E = mc^2$.	Approved textbook	10 days
	CC.3.5 CC.3.6	Reading Informational Text Writing	<u>Conceptual</u> <u>Physical Science</u> <u>Explorations:</u>	
			Chapter 20 Resource Guide	
Mixtures	3.2.12.A1	Compare and contrast colligative properties of mixtures.	Approved textbook	20 days
		Compare and contrast the unique properties of water	LEALDOOK	
		and other liquids.	Conceptual	
	CC.3.5	Reading information Text	Physical Science Explorations:	
			Chapter 22	
	CC.3.6	Writing	Resource Guide	
			Lab Activity	

Acids and Bases/Oxidation and Reduction	3.2.12.A4	Apply oxidation/reduction principles to electrochemical reactions.	Approved textbook	15 days
		Describe the interactions between acids and bases.	<u>Conceptual</u> Physical Science	
	CC.3.5	Reading Informational Text	Explorations: Chapters 25 and	
	CC.3.6	Writing	26 Resource Guide	
			Testing for Acids and Bases Lab Activity	
			Teacher demonstrations	
Earth and Space Science Topics (optional)	Not Applicable	Not Applicable	Approved textbook	Remaining days in school year
Final Exam Review	Not Applicable	Not Applicable	Approved textbook	10 days