

Publisher: CPO Science

Program Title: *CPO Focus on Physical Science*

Components used in Standards Map, with abbreviations: Student Edition (**SE: page #**), Investigation Manual (**INV: page #**), Teacher's Guide (**TE: page #**), Skill and Practice Worksheets (**SP: section # and "First word of title..."**), Teaching Illustrations (**TI: section # and "First word of title..."**)

Other program components: Equipment Kit, Black-line Answer Sheets, Pre-Assessment Questions, ELL Strategies, ExamView CD and booklet, Electronic Book (includes SE and INV)

Grade Level: Eight

**Standards Map – Basic Comprehensive Program
Science
Grade – Eight
Focus on Physical Science**

Grade	Standard #	Text of Standard	PUBLISHER CITATIONS		IMAP/CRP USE ONLY		
			Primary Citations	Supporting Citations	Meets Standard		IMAP/CRP Notes
					Y	N	
MOTION							
8	1	<u>The velocity of an object is the rate of change of its position.</u> As a basis for understanding this concept:					
8	1.a	<i>Students know</i> position is defined in relation to some choice of a standard reference point and a set of reference directions.	SE: 245-247 261, 262 INV: 8, 9	TE: 193 SP: 12.1 "Position..." TI: 12.1 "X and Y..."			
8	1.b	<i>Students know</i> that average speed is the total distance traveled divided by the total time elapsed and that the speed of an object along the path traveled can	SE: 248, 250-254, 257, 261, 262, 339 INV: 53-58	TE: 195 TI: 12.2 "Forms..."			

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					Y	N	
		vary.					
8	1.c	<i>Students know</i> how to solve problems involving distance, time, and average speed.	SE: 248, 250-254, 257, 261, 262, 339 INV: 53-58	TE: 195 TI: 12.2 “Forms...”			
8	1.d	<i>Students know</i> the velocity of an object must be described by specifying both the direction and the speed of the object.	SE: 249, 251, 252, 254, 261, 262, 274 INV: 58	TE: 194, 195 SP: 12.2 “Velocity”			
8	1.e	<i>Students know</i> changes in velocity may be due to changes in speed, direction, or both.	SE: 249, 251, 252, 254, 256, 259, 296 INV: 58	TE: 194, 195,			
8	1.f	<i>Students know</i> how to interpret graphs of position versus time and graphs of speed versus time for motion in a single direction.	SE: 253-257, 261, 262 INV: 55, 58	TE: 201 SP: 12.3 “Analyzing...” TI: 12.3 “Graphs...” TI: 12.3 “Drawing...”			
FORCES							
8	2	<u>Unbalanced forces cause changes in velocity.</u> As a basis for understanding this concept:					
8	2.a	<i>Students know</i> a force has both direction and magnitude.	SE: 264, 274-281, 285, 286, 288-290, 295, 297, 300, 303 INV: 59-63	TE: 218, 219			

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8	2.b	<i>Students know</i> when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces.	SE: 276, 277, 280, 281, 286, 289, 290, 300, 303 INV: 62, 63	SP: 13.1 “Mass...”			
8	2.c	<i>Students know</i> when the forces on an object are balanced, the motion of the object does not change.	SE: 263, 264, 277-281, 285, 286, 288-292, 295, 297 INV: 59, 63	TE: 235 SP: 13.2 “Equilibrium”			
8	2.d	<i>Students know</i> how to identify separately the two or more forces that are acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction.	SE: 6, 27, 264, 266, 268-273, 277, 279, 281, 295, 301, 302, 315, 320, 359 INV: 59-61	TE: 219 TI: 13.1 “Friction” TI: 13.2 “Free...”			
8	2.e	<i>Students know</i> that when the forces on an object are unbalanced, the object will change its velocity (that is, it will speed up, slow down, or change direction).	SE: 249, 252, 256, 264, 276, 278-281, 288, 290-292, 295, 297 INV: 56-58	TE: 235 SP: 14.1 “Isaac...” SP: 14.2 “Applying...” TI: 14.1 “Newton’s...”			
8	2.f	<i>Students know</i> the greater the mass of an object, the more force is needed to achieve the same rate of change in motion.	SE: 4, 294, 296-305, 307-309 INV: 66-67	TE: 235 SP: 14.2 “Acceleration: SP: 14.2 “Newton’s...” TI: 14.2 “Units...” TI: 14.2 “Acceleration...”			

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				TI: 14.2 "Newton's..."			
8	2.g	<i>Students know</i> the role of gravity in forming and maintaining the shapes of planets, stars, and the solar system.	SE: 301, 315, 320				
STRUCTURE OF MATTER							
8	3	<u>Each of the more than 100 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for understanding this concept:</u>					
8	3.a	<i>Students know</i> the structure of the atom and know it is composed of protons, neutrons, and electrons.	SE: 118-136, 130, 139, 336 INV: 25-30	TE: 53, 95, 97, 100, 101 SP: 6.1 "Atoms..." SP: 6.1 "Ernest..." SP: 6.1 "Niels..." SP: 6.1 "Marie..." SP: 6.1 "Rosalyn..." SP: 6.2 "Structure..." TI: 6.1 "Units..." TI: 6.1 "Size...:" TI: 6.1 "Electron..." TI: 6.2: "Spectral..."			

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				TI: 6.2 “Bohr’s...” TI: 6.2 “Orbitals” TI: 6.2 “Energy...”			
8	3.b	<i>Students know</i> that compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements.	SE: 53, 55, 146, 157-171, 186, 190 INV: 36-40	TE: 127, 129, 132, 135 SP: 8.2 “Dot...” SP: 8.2 “Chemical...” TI: 8.1 “Chemical...” TI: 8.1 “Periodic...” TI: 8.2 “Valence...” TI: 8.2 “Lewis...” TI: 8.2 “Oxidation...” TI: 8.2 “Predict...”			
8	3.c	<i>Students know</i> atoms and molecules form solids by building up repeating patterns, such as the crystal structure of NaCl or long-chain polymers.	SE: 53, 105, 106, 172, 173, 210, 215 TE: 83	TI: 8.1 “Chlorine...”			
8	3.d	<i>Students know</i> the states of matter (solid, liquid, gas) depend on molecular motion.	SE: 94-97, 103-105 INV: 24	TE: 77, 85 TI: 3.1 “Atoms...”			
8	3.e	<i>Students know</i> that in solids the atoms are closely locked in position and can only vibrate; in liquids the atoms and molecules are more loosely connected and can collide with and move past one another; and in gases the	SE: 5, 8, 54, 55, 94-97, 103-105 INV: 21-24	TE: 45, 83			

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		atoms and molecules are free to move independently, colliding frequently.					
8	3.f	<i>Students know</i> how to use the periodic table to identify elements in simple compounds.	SE: 139, 140, 142, 144-156 INV: 25-35	TE: 95, 113, 119, 133 TI: 7.1 “Periodic...” TI: 7.1 “Reading...”			
EARTH IN THE SOLAR SYSTEM (EARTH SCIENCE)							
8	4	<u>The structure and composition of the universe can be learned from studying stars and galaxies and their evolution.</u> As a basis for understanding this concept:					
8	4.a	<i>Students know</i> galaxies are clusters of billions of stars and may have different shapes.	SE: 356-359, 363 INV: 78	SP: 17 “Edwin...” TI: 17.1 “Types...” TI: 17.1 “Big...”			
8	4.b	<i>Students know</i> that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color.	SE: 336-354, 361, 362 INV: 68, 69, 72-77	TE: 250, 279 SP: 16.1 “Scientific...” SP: 16.1 “The Sun...” SP: 16.1 “Calculating...” TI: 16.1 “Sun...” TI: 16.1 “Stars...” TI: 16.1 “H-R...” TI: 16.2 “Evolution...”			

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8	4.c	<i>Students know</i> how to use astronomical units and light years as measures of distances between the Sun, stars, and Earth.	SE: 314, 320, 339, 356, 358, 363 INV: 69, 79, 80	SP: 15.1 “Ratios...” SP: 16.1 “Scientific...” SP: 16.1 “Understanding...”			
8	4.d	<i>Students know</i> that stars are the source of light for all bright objects in outer space and that the Moon and planets shine by reflected sunlight, not by their own light.	SE: 312, 320, 323	TE: 251			
8	4.e	<i>Students know</i> the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids.	SE: 7, 8, 302, 311-329, 333, 334, 345 INV: 68-72	TE: 245 SP: 15.1 “Ratios...” SP: 15.1 “Copernicus” SP: 15.1 “Galileo...” SP: 15.1 “Johann...” SP: 15.1 “Benjamin...” SP: 15.1 “Touring...” SP: 15.1 “Gravity...” TI: 16.2 “Forming...” TI: 15.1 “The Solar...” TI: 15.1 “Planet...”			

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				TI: 15.1 “Overview...” TI: 15.2: “Mercury, etc...”			
REACTIONS							
8	5	<u>Chemical reactions are processes in which atoms are rearranged into different combinations of molecules.</u> As a basis for understanding this concept:					
8	5.a	<i>Students know</i> reactant atoms and molecules interact to form products with different chemical properties.	SE: 53, 138, 159-161, 164, 201-207, 219, 220 INV: 45-48	TE: 111, 159 TI: 8.2 “Periodic...” TI: 10.1 “Products...” TI: 10.1 “Chemical...”			
8	5.b	<i>Students know</i> the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.	SE: 205-207, 211, 214, 215, 219, 220 INV: 47, 48	TE: 159 SP: 10.1 “Chemical...” SP: 10.2 “Predicting...” SP: 11.1 “Classifying...” TI: 10.1 “Balance...”			
8	5.c	<i>Students know</i> chemical reactions usually liberate heat or absorb heat.	SE: 208, 209, 215 INV: 46	TE: 164 TI: 10.2 “Exothermic...” TI: 10.2			

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				“Compare...”			
8	5.d	<i>Students know</i> physical processes include freezing and boiling, in which a material changes form with no chemical reaction.	SE: 97-99, 138, 146 INV: 23	TE: 82, 111			
8	5.e	<i>Students know</i> how to determine whether a solution is acidic, basic, or neutral.	SE: 179, 188-195 INV: 43, 44	TE: 148, 149 SP: 9.1 “Calculating...” TI: 9.2 “The pH...” TI: 9.2 “pH Ranges...” TI: 9.2 “Neutralization: TI: 9.2 “pH Scale...”			
CHEMISTRY OF LIVING SYSTEMS (LIFE SCIENCE)							
8	6	<u>Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept:</u>					
8	6.a	<i>Students know</i> that carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms.	SE: 221, 222-241 INV: 49-52	TI: 11.1 “Composition...”			
8	6.b	<i>Students know</i> that living organisms are made of molecules consisting largely of carbon,	SE: 6, 221, 222-241 INV: 49-52	TI: 11.1 “Photosynthesis...”			

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		hydrogen, nitrogen, oxygen, phosphorus, and sulfur.					
8	6.c	<i>Students know</i> that living organisms have many different kinds of molecules, including small ones, such as water and salt, and very large ones, such as carbohydrates, fats, proteins, and DNA.	SE: 6, 158, 223, 224, 228-235 INV: 51, 52	TE: 175, 177, 181, 183 TI: 11.1 “ADP/ATP” TI: 11.2 “Enzymes”			
PERIODIC TABLE							
8	7	<u>The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept:</u>					
8	7.a	<i>Students know</i> how to identify regions corresponding to metals, nonmetals, and inert gases.	SE: 140, 142 INV: 31, 32	TE: 111, 113, 119, 133 TI: 7.1 “Groups...” TI: 7.1 “Energy...”			
8	7.b	<i>Students know</i> each element has a specific number of protons in the nucleus (the atomic number) and each isotope of the element has a different but specific number of neutrons in the nucleus.	SE: 123-126, 141 INV: 25-30	TE: 95 SP: 6.1 “Atoms...”			
8	7.c	<i>Students know</i> substances can be classified by their properties, including their melting	SE: 73-87, 94, 98, 100, 101, 103, 138, 144,	TE: 61, 67, 77, 117 TI: 5.2 “Thermal...”			

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		temperature, density, hardness, and thermal and electrical conductivity.	146, 150, 151 INV: 15-22	TI: 5.1 "Temperature..."			
DENSITY AND BUOYANCY							
8	8	<u>All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept:</u>					
8	8.a	<i>Students know</i> density is mass per unit volume.	SE: 73-81, 85-92, 100, 101 INV: 15-18	TI: 4.1 "Density..."			
8	8.b	<i>Students know</i> how to calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.	SE: 74-81, 92 INV: 15-18	TE: 61 SP: 4.1 "Calculating..." SP: 4.1 "Density..." TI: 4.1 "Solving..."			
8	8.c	<i>Students know</i> the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced.	SE: 73, 82-89 INV: 20	TE: 67 SP: 4.2 "Buoyancy" TI: 4.2 "Example..."			
8	8.d	<i>Students know</i> how to predict whether an object will float or sink.	SE: 73, 82-87, 91, 92 INV: 19, 20	TE: 66, 67 SP: 4.2 "Archimedes' Principle" SP: 4.2 "Archimedes" TI: 4.2			

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					Y	N	
				"Average..."			
INVESTIGATION AND EXPERIMENTATION							
8	9	<u>Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:</u>					
8	9.a	Plan and conduct a scientific investigation to test a hypothesis.	SE: 17-21, 37, 38, 43, 47, 48 INV: 1, 2, 7	TE: 35 SP: 2.2 "Scientific..." TI: 1.3 "Steps..."			
8	9.b	Evaluate the accuracy and reproducibility of data.	SE: 19, 40-43 INV: 2, 6, 7, 9, 13, 54, 58, 61, 67, 75, 90, 96, 109, 110	TE: 34 SP: 2.2 "Averaging..." SP: 2.2 "Percent..." SP: 2.2 "Significant..."			
8	9.c	Distinguish between variable and controlled parameters in a test.	SE: 28-36, 39, 43, 47, 48 INV: 6, 7, 66	TI: 2.1 "Relationships..." TI: 2.1 "Dependent..."			
8	9.d	Recognize the slope of the linear graph as the constant in the	SE: 254, 257 INV: 16, 58	TE: 63 SP: 4.1			

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		relationship $y=kx$ and apply this principle in interpreting graphs constructed from data.		“Calculating...”			
8	9.e	Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.	SE: 30-33, 36, 253-257 INV: 9, 16, 21, 55, 60, 66, 74, 90, 107	TI: 12.3 “Graphs...” TI: 12.3 “Drawing...”			
8	9.f	Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure x area, volume = area x height).	SE: 35, 36, 59, 78, 79, 248, 250-254, 257, 267, 273, 280, 300, 339 INV: 15-19, 53-55, 57, 97-100	TE: 17, 195 SP: 1.2 “SI Units” SP: 1.2 “SI-English” SP: 1.2 “Dimensional...” SP: 2.1 “Solving...” TI: 2.1 “Basic...” TI: 2.1 “Formula...” TI: 4.1 “Steps...” TI: 4.1 “Solving...”			
8	9.g	Distinguish between linear and nonlinear relationships on a graph of data.	SE: 30, 31 INV: 21, 58 TE: 19	TI: 2.1 “Direct...”			
Appendix							