Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
3.1.7.A 7	Unifying Themes	Explain the parts of a simple system and their relationship to each other.	96	how systems may reach equilibrium	
			97	equilibrium	
			98	equililbrium	
			99	equilibrium	
			129	parts of a car and ramp system	
			129	defining a system	
			134	identify and describe parts of a system in nature	
			134	understand concept of system	
			219	restoring forces and equilibrium	
			219	equilibrium and harmonic motion	
			367	form and function	
			390	recognize and describe how systems may reach equilibrium	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.1.7.B 7	Unifying Themes	Describe the use of models as an application of scientific or technological concepts.		featured in Ancillary Skillsheet "Dimensional Analysis", "Ratios and Proportions", "Gear Ratios"	9	calculate speed
			7	testing models	14	construct a graphical model
			36	using algebraic models	15	construct a graphical model
			48	design and test a model to solve a problem	17	make graph from data
			60	graphs	22	make model from data
			61	making and evaluating graphs	27	calculate speed
			62	constructing a graph	27	making a graph from data
			63	know that scientific knowledge can be in the form of models	29	find the mechanical advantage
			63	constructing graph from data	56	find the mass/volume ratio
			83	using algebraic formulas	83	scientific knowledge is sometimes in the form of models
			86	using algebraic models	110	lab notebook
			98	using algebraic model	111	making graphs
			115	using algebraic models		
			124	design and test a model that solves a problem		
			138	the power equation		

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			150	design a model to solve a problem	
			200	equation for Ohm's law	
			222	harmonic motion graphs	
			227	calculating wave speeds	
			294	making a graph	
			325	design and test model	
			340	make and evaluate graphs	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.1.7.C 7	Unifying Themes	Identify patterns as repeated processes or recurring elements in science and technology.	156	orbits of planets and moons and other bodies	32	orbit of the moon
			157	describe orbits of planets	65	identify groups or families on periodic table
			158	orbit of moon	67	identify metals and nonmetals and metalloids
			164	orbits of other bodies in the solar system	67	recognizing groups or families
			164	other bodies in solar system		
			165	compare Earth to other planets with respect to supporting life		
			166	compare planets to Earth		
			166	compare orbits of planets		
			166	classify and compare planets		
			167	classify and compare planets		
			168	compare other planets with Earth with respect to supporting life		
			168	classify planets		
			169	compare other planets to Earth with respect to supporting life		
			169	orbits of moons		
			169	classify planets		

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			170	orbits of other moons	
			170	classify and compare planets	
			171	compare orbits of planets in solar system	
			171	compare and classify planets	
			172	classify planets	
			173	orbits on bodies in solar system	
			173	compare Earth to other planets with respect to supporting life	
			173	classify planets	
			286	Earth compared with other planets with respect to supporting life	
			316	classify materials based on physical properties	
			317	classify materials based on properties	
			344	chemical and physical properties	
			345	recognizing groups or families on the periodic table	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
			346	identify metals and nonmetals on the periodic table		
			348	recognizing groups and families of periodic table		
			348	recognizing metals and nonmetals and metalloids		
			350	physical and chemical properties		
			350	recognizing groups and families and periodic table		
			353	groups on periodic table		
			357	classify by chemical and physical properties		
			357	melting and boiling points		
			358	physical properties of gold		
3.1.7.D 7	Unifying Themes	Explain scale as a way of relating concepts and ideas to one another by some measure.		featured in Ancillary Skillsheet "Significant Differences in Measurement"	16	understand the sensitivity of a measuring tool
			12	rulers	73	measure densities
			30	understand sensitivity of measuring tools	95	metric and English rulers
			76	rulers	96	metric rulers
					97	metric rulers
					98	metric rulers
					101	rulers

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.1.7.E 7	Unifying Themes	Identify change as a variable in describing natural and physical systems.		featured in Ancillary Skillsheet "Dimensional Analysis", "Ratios and Proportions", "Gear Ratios"	9	speed calculation
			4	speed	9	calculate speed
			6	speed	10	speed calculation
			34	speed	13	concept of speed
			35	understand and calculate speed	22	calculate speed
			36	using algebraic models	24	quantitative understanding of Newton's second law
			40	understand concept of speed	25	Newton's second law
			54	concept of speed	27	calculate speed
			55	speed	29	find the mechanical advantage
			56	speed	56	find the mass/volume ratio
			60	calculating speed		
			64	calculating speed		
			75	speed		
			76	speed		
			83	using algebraic formulas		
			86	using algebraic models		
			98	using algebraic model		
			115	using algebraic models		

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			115	Newton's second law—quantitative	
			120	Newton's second law—qualitative	
			138	the power equation	
			158	phases of the moon	
			159	properties of the moon	
			159	the moon's effect on tides on Earth	
			167	Earth and moon relationship	
			167	relationship between Earth and sun and summer and winter	
			177	concept of speed	
			199	Ohm's law	
			200	equation for Ohm's law	
			200	Ohm's law	
			227	calculating wave speeds	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.2.7.A 7	Inquiry and Design	Explain and apply scientific and technological knowledge.	24	repeatability of investigations is necessary for verification	2	experiment to answer questions
			28	asking scientific questions	5	repeatability of results
			29	recognize that repeatability of investigations is necessary	5	collaboration
			32	trace development of theories	8	which ramp is the fastest?
			32	describe steps of the scientific method	13	what kind of motion happens?
			33	recognize repeatability of investigation is necessary for verification of evidence	18	how does friction affect motion?
			43	recognize that repeatability of investigation is necessary for validation of scientific evidence	21	what happens when force is applied?
			345	history of periodic table development	23	how does acceleration depend on force and mass?
			360	historical developments of periodic table	26	where does the marble move the fastest?
			379	history of an invention	31	why does it look like the moon's shape changes?
			401	scientific method	39	what are the properties of magnetism?
					43	what variables affect the pendulum?
					43	design scientific experiments
					46	how is color created?
					50	how are temperature and heat related?

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page	Volume 2 Investigation Manual page
				75 what is pH?

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.2.7.B 7	Inquiry and Design	Apply process knowledge to make and interpret observations.		featured in Ancillary Skillsheet "Significant Differences in Measurement"	2	understand measurements of time
			11	use and understand mass measurements	3	identifying cause and effect relationships
			12	length measurement	3	identify cause and effect relationships
			12	measurement	4	measurements
			13	time measurements	4	mass measurements
			24	mass measurements	5	measurement and selecting appropriate tools
			28	interpreting observations and proposing explanations	5	length measurement
			29	construct explanations supported by direct and indirect evidence	6	construct reasonable explanations supported by direct and indirect data
			30	understand sensitivity of measuring tools	6	formulate testable hypothesis
			33	formulate a testable hypothesis	7	develop procedure someone else could follow
			34	recognizing variables	7	interpreting observations and proposing explanations
			35	length units	7	test hypothesis against observations
			35	time units	9	make hypothesis
			37	measurements in English and metric units	9	formulate testable hypothesis

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
			41	recognizing and controlling variables in observations and experiments	9	test hypothesis against observations
			44	identifying cause and effect relationships	10	recognize and control variables
			45	identifying cause and effect relationships	12	design a procedure others can follow
			54	variables	13	conduct car/ramp experiment
			61	identify cause and effect relationships—real and hypothesized	14	explain using data
			62	identifying cause and effect relationships	16	understand the sensitivity of a measuring tool
			62	use measurements of time	16	use units of force
			63	make predictions	19	formulate a testable hypothesis
			63	identifying cause and effect relationships	24	control variables
			76	measurements	24	cause and effect relationships
			81	understand and use units of force	26	make testable hypothesis
			86	understand units of force	28	units of force
			97	understand and use units of force	30	units for work
			102	design an experiment that others could follow	34	length measurements in km
			128	joule is a unit of energy	38	construct explanations based on evidence
					40	constructing explanations

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
			132	units of work and energy	43	design scientific experiments
			138	units of power	43	recognizing and controlling variables
			184	measuring	49	explanations based on evidence
			192	measuring electric current	49	measuring
			193	measuring voltage	55	make predictions based on observations
			198	electrical power is measured in watts	56	measure volume with a variety of methods
			242	explanations based on observations	58	interpret observations
			270	interpreting observations and making explanations	58	conduct scientific vocabulary
			284	joules and heat energy	58	make predictions on observed data
			299	measure volume of regular and irregular objects using several methods	73	measure densities
			300	measure densities	76	interpret observations
			302	measure and compare densities	77	measurements
			302	volume of regular solids	79	mass measurements
			340	make predictions baed on data	80	recognizing and controlling variables
			404	construct explanations based on data	80	interpret observations
			444	explanations based on evidence	82	make predictions based on inferences from data

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page	Volume 2 Investigation Manual page
				92 design experiment that someone else can follow
				95 measuring
				95 understanding length measurements
				96 measuring
				97 measuring
				97 length measurements
				98 measuring
				101 measurements
				101 measure volume of regular objects
				102 volume of regular objects
				102 measurements
				103 measurements
				103 measure volume of regular objects
				104 measure volume of regular objects
				105 measure volume of irregular objects
				107 mass in kg and gm
				108 mass in kg and gm

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.2.7.C 7	Inquiry and Design	Identify and use the elements of scientific inquiry to solve problems.	28	interpreting observations and proposing explanations	3	identifying cause and effect relationships
			29	communication is important to science	3	identify cause and effect relationships
			34	recognizing variables	7	interpreting observations and proposing explanations
			41	recognizing and controlling variables in observations and experiments	7	test hypothesis against observations
			44	identifying cause and effect relationships	9	test hypothesis against observations
			45	identifying cause and effect relationships	10	recognize and control variables
			54	variables	13	conduct car/ramp experiment
			61	identify cause and effect relationships—real and hypothesized	24	control variables
			62	identifying cause and effect relationships	24	cause and effect relationships
			63	identifying cause and effect relationships	32	communicating as essential to science
			76	line graphs	32	sketches
			102	sketches	38	diagrams
			119	diagrams	41	making sketches
			150	sketches	43	recognizing and controlling variables
					43	design scientific experiments

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
			269	communication as essential to science	45	sketches
			270	interpreting observations and making explanations	58	conduct scientific vocabulary
			318	oral presentation of results	58	interpret observations
			318	write up results	76	interpret observations
			340	line graphs	80	recognizing and controlling variables
			364	common chemical reactions—rust	80	interpret observations
			380	writing up results	92	formal lab report
			444	reading data tables	93	communicating results is essential to science
					93	writing up results
					93	lab reports
					94	writing up results
					94	lab report
					110	lab report
					111	making graphs
					111	reading graphs

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.2.7.D 7	Inquiry and Design	Know and use the technological design process to solve problems.	7	testing models	45	sketch the wave fronts
			7	design cycle		
			39	steps of design cycle		
			48	design and test a model to solve a problem		
			97	create and interpret dimensional drawings		
			99	dimensioned drawings		
			124	design and test a model that solves a problem		
			150	design a model to solve a problem		
			214	propose a solution to a problem		
			325	design and test model		

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.4.10.A 10	Physical Science, Chemistry and Physics	Explain concepts about the structure and properties of matter.	5	properties of solids and liquids and gas	16	forces as ability to change motion
			18	matter is composed of atoms	52	common phase changes
			19	describe matter as composed of atoms	53	states of matter based on arrangement and motion of atoms
			20	matter as composed of atoms	53	phase changes
			20	recognize that compounds are composed of elements	59	understand the structure of an atom based on protons and neutrons and electrons
			174	structure of atoms—electrons and protons and neutrons	59	what isotopes are
			280	physical differences between phases of matter	59	atomic symbol and atomic number and mass number
			280	phases of matter	59	Bohr model
			281	phase changes	61	periodic table
			301	physical differences between states of matter	62	understand the structure of an atom based on protons and neutrons and electrons
			310	explain matter states based on arrangement of atoms	62	structure of an atom
			314	compounds composed of elements	63	identify symbols and atomic number and mass number
			324	atoms are made up of proton and neutron and electron	63	what isotopes are

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
			325	protons neutrons and electrons	64	identify symbol and atomic number and mass number of elements
			326	basic properties of an atom and the three subatomic particles	64	build and describe periodic table
			328	understand how atomic structure determines the identity of elements—atomic number	65	identify groups or families on periodic table
			329	structure of an atom and three smaller particles	66	identify symbol and atomic number and mass number of elements
			330	explain what isotopes are	66	periodic table
			331	three subatomic particles and their charge	67	recognizing groups or families
			331	explain what isotopes are	67	identify metals and nonmetals and metalloids
			336	electron shells	67	periodic table
			339	structure of atoms	68	periodic table
			339	properties of subatomic materials	69	structure of an atom
			343	explain common chemical properties of elements in relation to the periodic table	69	how electrons interact to create chemical bonds
			345	common chemical properties in relation to the periodic table	70	how electrons interact to create bonds
			345	describe periodic table	70	how positive and negative ions are created
					70	structure of an atom

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
			345	recognizing groups or families on the periodic table	70	three subatomic particles—charge and mass
			345	idea of atomic mass	78	how energy is manifested in chemical reactions
			346	identify metals and nonmetals on the periodic table	79	investigate law of conservation of mass
			347	explain what isotopes are	80	investigate and recognize that the chemical reactions can be represented as systems with reactants and products
			348	common chemical properties of elements based on relation to periodic table	80	law of conservation of mass
			348	recognizing groups and families of periodic table	81	explain how special bonding properties of carbon make possible the great variety and complexity of biomolecules
			348	recognizing metals and nonmetals and metalloids	81	carbon and hydrogen and nitrogen and oxygen combine to form biomolecules
			348	describing periodic table	82	understand that carbon and hydrogen and nitrogen and oxygen combine to form biomolecules
			349	explain common chemical properties in relation to placement on periodic table		
			350	recognizing groups and families and periodic table		
			350	describe periodic table		
			351	explain common chemical properties of elements in relation to periodic table		

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			352	properties in relation to periodic table	
			352	how electron interactions create bonds	
			352	describe periodic table	
			353	chemical properties in relation to periodic table	
			353	groups on periodic table	
			357	describe characteristics based on place in periodic table	
			360	identify symbols of atoms	
			363	recognize that compounds are made of elements	
			364	understand biomolecules	
			364	compounds are composed of elements	
			365	difference between covalent and ionic bonds	
			365	how electrons are involved in bonds	
			365	explain chemical reactions in terms of atoms and molecules	
			366	rules for writing formulas	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			368	difference between ionic and covalent compounds	
			368	difference between ionic and covalent bonds	
			368	how electrons are involved in bonds	
			368	how ions are formed	
			369	energy changes that accompany chemical reactions	
			369	properties of elements in relation to the periodic table	
			369	how electron interactions help create chemical bonds	
			370	energy changes that accompany chemical changes	
			370	distinguish between ionic and covalent compounds	
			371	explain the chemical properties of elements in relation to periodic table	
			371	how electrons are involved in bonds	
			372	how electrons are involved in bonding	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			372	explain chemical properties based on location in periodic table	
			373	how electrons are involved in bonding	
			374	chemical properties based on placement in periodic table	
			374	explain how ions are formed	
			374	how electrons are involved in bonding	
			375	apply rules for writing formulas of simple chemical compounds	
			375	apply rules for writing formulas of simple chemical compounds	
			376	explain why ions are formed	
			376	distinguish between ionic compounds and covalent molecules	
			377	qualitative understanding of how electron interactions create bonds	
			392	compare covalent and ionic bonds	
			396	how ions are formed	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			407	metabolism is a collection of reactions	
			408	chemical reactions occur all around us	
			409	chemical reactions can be represented as systems of reactants and products	
			409	explain chemical changes in terms of arrangement of molecules and atoms	
			410	chemical reactions in terms of atoms and molecules	
			410	chemical reactions can be represented as systems with reactants and products	
			410	chemical reactions in terms of arrangements of molecules and atoms	
			411	write balanced chemical equations	
			411	conservation of mass	
			412	write balanced chemical equations	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			413	recognize that chemical reactions can be represented as systems with reactants and products	
			413	balance equations	
			414	explain how energy is manifested in chemical reactions—exothermic and endothermic	
			415	how energy is manifested in chemical reactions	
			415	analyze energy changes that accompany chemical reactions	
			416	reaction types	
			417	balance chemical equations	
			417	common types of chemical reactions	
			418	common types of chemical reactions	
			419	chemical reactions occur all around us—in cars	
			420	conservation of mass	
			421	balanced chemical reactions	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			421	common types of chemical reactions	
			421	energy manifested in chemical reactions	
			422	chemical reactions all around us	
			422	energy changes in chemical reactions	
			423	chemical reactions all around us	
			424	chemical reactions take place all around us	
			427	special properties of carbon that make possible a great variety and complexity of biomolecules	
			428	understand biomolecules	
			428	special bonding properties of carbon	
			430	metabolism as interrelated chemical reactions	
			430	special bonding properties of carbon	
			432	metabolism as an interrelated collection of chemical reactions	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			434	special bonding properties of carbon	
			435	metabolism	
			435	carbon and hydrogen and oxygen make up biomolecules	
			437	different types of reactions—factors that affect reaction rates	
			437	metabolism—interrelated chemical reactions	
			438	metabolism	

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CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.4.10.B 10	Physical Science, Chemistry and Physics	Analyze energy sources and transfers of heat.	10	conservation of energy (i.e. potential and kinetic)	36	series circuit
			118	Newton's third law—action and reaction	37	series circuit
			119	Newton's third law—qualitative	37	parallel circuit
			119	Newton's third law—qualitative		
			121	Newton's third law		
			122	third law and rockets		
			124	Newton's third law		
			124	third law qualitative understanding		
			130	law of conservation of energy		
			131	conservation of energy		
			134	conservation of energy in a broader context		
			192	electric current		
			193	understanding voltage		
			194	current in simple circuits		
			194	how batteries work		
			199	Ohm's law		
			199	electrical resistance		
			199	concept of voltage		

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CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			199	concept of current	
			200	Ohm's law	
			201	resistance of common objects	
			212	current	
			212	voltage	
			213	current	
			369	energy changes that accompany chemical reactions	
			370	energy changes that accompany chemical changes	
			415	analyze energy changes that accompany chemical reactions	
			422	energy changes in chemical reactions	

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CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category		Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.4.10.C 10	Physical Science, Chemistry and Physics	Distinguish among the principles of force and motion.	Distinguish among the principles of force and motion.	4	speed	8	measurement and calculation of speed
				4	Newton's second law qualitative	8	determine the speed of an object
				6	speed	9	speed calculation
				17	force as ability to change motion	9	determine speed of an object
				22	efficiency of electric motors	10	speed calculation
				22	efficiency of gasoline engine	13	concept of speed
				34	speed	15	calculate speed of a moving object
				35	understand and calculate speed	18	investigate the effects of friction on motion of objects
				40	understand concept of speed	18	investigate the effects of friction on motion of objects
				46	how light helps us see	19	investigate effects of friction on motion
				46	how infrared light is used in real life	19	investigate effects of friction on motion
				47	how infrared is used in technology	20	effects of friction
				54	concept of speed	20	effects of friction
				55	speed	21	force as an action that changes motion
				55	compare and contrast speed and velocity		
				56	compare and contrast speed and velocity		

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
			56	speed	21	balanced or unbalanced forces causing changes in motion
			60	calculating speed	22	acceleration as change in speed
			60	changes in motion can be represented graphically	22	calculate speed
			64	calculating speed	23	Newton's second law
			64	changes in motion can be shown graphically	24	quantitative understanding of Newton's second law
			64	position vs. time graphs	24	understanding of acceleration as a rate of change of velocity
			65	changes in motion can be represented graphically	25	Newton's second law
			65	speed vs. time graph	27	calculate speed of a moving object
			66	speed vs. time graph	28	simple machines
			66	constant velocity	29	efficiency of simple machines
			66	calculations for speed	30	simple machines
			66	compare and contrast speed and velocity	31	calculate speed of the car
			67	conceptual understanding of acceleration as describing change in speed	35	concept of electrical charge
			68	quantitative understanding of acceleration as a rate of change of velocity	35	concept of electric current
			69	speed vs. time graph	39	magnetic field
			70	effect of gravity on motion		

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CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
			70	effect of gravity on motion	40	investigate relationship between magnetism and electricity using electromagnets
			72	projectile explained		
			72	projectile explained	41	use pendulum to explore amplitude and period and frequency and cycle
			73	quantitative understanding of acceleration as change in speed	42	use pendulum to investigate cycle and period
			73	Newton's second law	43	use pendulum to investigate period
			74	how light helps us see	44	reflection
			75	how light helps us see	44	demonstrate waves using slinky
			75	speed	44	wavelength and frequency and speed of waves
			76	speed	45	making circular waves in a ripple tank
			76	position vs time graphs	45	categorize waves by how they move
			79	changes in motion require force	45	wave characteristics through water
			80	understand force as an action with potential to change motion	46	RGB model of color
			80	forces needed to change motion	46	reflected vs emitted light
			82	effect of gravity on objects	46	how light helps us see
			82	effect of gravity on objects		
			87	effect of friction on motion		
			87	effect of friction on motion		

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
			88	effects of friction on motion of objects	47	investigate RGB and CMYK models of color
			88	effects of friction on motion of objects	47	RGB and CMYK color models
			89	effects of friction on motion	48	refractive optics such as lenses
			89	effects of friction on motion	48	refraction of light
			89	changes in motion require application of force		
			90	effects of friction on motion		
			90	effects of friction on motion		
			91	effects of friction		
			91	effects of friction		
			92	effects of friction		
			92	effects of friction		
			93	effects of friction on motion		
			93	effects of friction on motion		
			94	compare and contrast constant and changing velocity		
			95	balanced and unbalanced forces		

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			96	effects of gravity	
			96	effects of gravity	
			96	change in motion require force	
			97	use concepts of balanced or unbalanced forces	
			97	quantitative understanding of force changing motion	
			98	balanced and unbalanced forces	
			99	unbalanced forces cause motion	
			99	effect of friction on motion	
			99	effect of friction on motion	
			100	Newton's laws applied to real situations	
			100	how gravity affects motion	
			100	Newton's first law	
			100	how gravity affects motion	
			101	Newton's laws applied to planes	
			101	concept of forces	
			101	effects of friction (drag) on motion of planes	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			101	effects of friction (drag) on motion of planes	
			102	investigate how friction affects motion	
			102	investigate how friction affects motion	
			108	conceptual understanding of a force as the action with the potential to change motion	
			108	changes in motion require force	
			109	change in motion requires force	
			110	compare and contrast constant and changing velocity	
			111	force is an action with potential to change motion	
			113	acceleration is a rate of change of speed	
			113	concept of acceleration	
			113	Newton’s second law	
			114	Newton’s second law—qualitative	
			114	Newton’s second law—qualitative	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			114	Newton's second law—qualitative	
			115	acceleration is a change in speed	
			115	Newton's second law—quantitative	
			116	conceptual understanding of acceleration as change in speed	
			117	understand and use concept of balanced and unbalanced forces to create motion	
			118	Newton's third law—action and reaction	
			118	balanced and unbalanced forces	
			119	Newton's third law—qualitative	
			119	Newton's third law—qualitative	
			120	Newton's laws in terms of real situations—sports and cars	
			120	Newton's second law—qualitative	
			121	effect of friction on objects	
			121	effect of friction on objects	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			121	Newton's third law	
			122	third law and rockets	
			123	Newton's laws and space travel	
			124	force as ability to change motion	
			124	Newton's second law	
			124	Newton's first law	
			124	Newton's third law	
			124	third law qualitative understanding	
			136	understanding of force as the ability to change motion	
			140	simple machines	
			141	simple machines and forces	
			142	friction and machines	
			142	friction and machines	
			143	efficiency explained	
			144	simple machines and the human body	
			144	how a lever works	
			145	how a rope and pulley system works	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			146	how gears and ramps work	
			156	effect of gravity on motion	
			156	effect of gravity on motion	
			157	constant and changing velocity	
			160	effect of gravity on motion of objects	
			160	effect of gravity on motion of objects	
			177	concept of speed	
			190	compare and contrast electrical force and magnetic force	
			190	electric charge	
			191	understanding electric charge	
			191	what causes shocks	
			191	charged objects and static electricity	
			203	what is a magnet	
			204	concept of magnetic field	
			206	magnetic vs electric force	
			207	finding the poles of an electromagnet using right-hand rule	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			209	electromagnetic induction explained	
			214	how coils concentrate magnetic field	
			214	relationship between magnetic field and electric charge	
			218	understanding a cycle	
			218	a pendulum's cycle	
			220	period is the time for one cycle	
			220	frequency is the inverse of period	
			220	frequency explained	
			221	friction and damping	
			221	friction and damping	
			221	amplitude explained	
			223	resonance explained	
			225	waves transmit energy	
			226	frequency and amplitude and wavelength of waves	
			227	the speed of waves	
			228	longitudinal waves	
			228	transverse waves	
			229	reflected waves	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			229	refracted waves	
			230	destructive interference	
			233	acoustics	
			234	speed of sound	
			235	sound as a wave	
			235	electromagnetic waves in common technology (i.e. radar)	
			235	wavelength and frequency	
			236	sound as a wave	
			237	how a French horn works	
			237	wavelength of sound	
			238	how the ear works	
			240	reflection of waves	
			240	why sound is a wave	
			240	how we hear sound	
			240	absorption of sound waves	
			241	how we hear sound	
			242	sound as a wave	
			242	how we hear sound	
			246	seeing and reflected light	
			247	light is produced by atoms	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			248	white light is a mixture of colors	
			249	speed of light	
			249	speed of light	
			250	energy and color of light	
			250	wavelength and frequency of visible light	
			251	nature of light in terms of waves and energy info flow	
			251	nature of light in terms of waves and energy info flow	
			251	what makes light	
			252	uses of electromagnetic waves	
			252	properties of electromagnetic waves with different wavelengths	
			252	electromagnetic spectrum	
			254	how the human eye sees light	
			255	how the human eye sees color	
			256	the RGB color process	
			257	color as reflected light	

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			257	subtractive color process	
			257	how light helps us see	
			258	the CMYK color process	
			259	explain how colors of light relate to wavelength	
			259	color seen as reflected light	
			261	mirrors reflect light	
			262	how light helps us see	
			262	wave interactions like reflection	
			262	absorption	
			262	refraction	
			263	reflection of light	
			263	refraction of light	
			264	reflection explained	
			268	what makes light	
			299	investigate density of fluid	
			305	investigate buoyancy	
			306	investigate properties—including buoyancy	
			309	investigate buoyancy	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			332	explain how we see color in terms of reflected or emitted light	
			390	factors that affect solubility	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category		Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.4.10.D 10	Physical Science, Chemistry and Physics	Explain essential ideas about the composition and structure of the universe.	Explain essential ideas about the composition and structure of the universe.	156	orbits of planets and moons and other bodies	32	orbit of the moon
				157	describe orbits of planets	33	general characteristics of the solar system
				158	orbit of moon	34	know general structure of the solar system
				160	place of Earth in the solar system	34	relationship of the solar system to the universe—Milky Way galaxy
				161	general structure of the solar system		
				162	general position of Earth		
				163	general structure of solar system		
				164	orbits of other bodies in the solar system		
				164	other bodies in solar system		
				165	general structure of solar system		
				166	compare orbits of planets		
				169	orbits of moons		
				170	orbits of other moons		
				171	compare orbits of planets in solar system		
				171	theories of origin of universe		
				173	orbits on bodies in solar system		

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			176	explain how stars form and features of life cycle	
			176	compare the Sun to other stars	
			176	explain how stars form and features of life cycle	
			177	explain use of light years	
			178	how stars produce energy	
			178	explain how stars produce energy	
			178	how stars produce energy	
			178	explain how stars produce energy	
			179	relationship of solar system to the universe	
			179	general characteristics of universe—galaxies	
			179	light years	
			180	light years	
			180	characteristics of the universe	
			181	description of galaxy as we know it	
			181	light years	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.4.7.A 7	Physical Science, Chemistry, and Physics	Describe concepts about the structure and properties of matter.	18	matter is composed of atoms	59	understand the structure of an atom based on protons and neutrons and electrons
			19	describe matter as composed of atoms	62	understand the structure of an atom based on protons and neutrons and electrons
			20	matter as composed of atoms	62	structure of an atom
			20	recognize that compounds are composed of elements	69	structure of an atom
			174	structure of atoms—electrons and protons and neutrons	70	structure of an atom
			314	compounds composed of elements	77	difference between chemical and physical changes
			316	classify materials based on physical properties	80	investigate and recognize that the chemical reactions can be represented as systems with reactants and products
			317	classify materials based on properties		
			324	atoms are made up of proton and neutron and electron		
			329	structure of an atom and three smaller particles		
			339	structure of atoms		
			344	chemical and physical properties		

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			344	difference between chemical and physical changes	
			350	physical and chemical properties	
			357	classify by chemical and physical properties	
			357	melting and boiling points	
			358	physical properties of gold	
			363	recognize that compounds are made of elements	
			364	compounds are composed of elements	
			368	difference between ionic and covalent bonds	
			407	differences between chemical and physical change	
			408	chemical reactions occur all around us	
			408	difference between physical and chemical change	
			409	chemical reactions can be represented as systems of reactants and products	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			410	chemical reactions can be represented as systems with reactants and products	
			411	write balanced chemical equations	
			412	write balanced chemical equations	
			413	recognize that chemical reactions can be represented as systems with reactants and products	
			413	balance equations	
			413	difference between chemical and physical change	
			416	reaction types	
			417	balance chemical equations	
			417	common types of chemical reactions	
			418	common types of chemical reactions	
			419	chemical reactions occur all around us—in cars	
			421	common types of chemical reactions	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page	Volume 2 Investigation Manual page
			421 balanced chemical reactions 422 chemical reactions all around us 423 chemical reactions all around us 424 chemical reactions take place all around us	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.4.7.B 7	Physical Science, Chemistry, and Physics	Relate energy sources and transfers to heat and temperature.	5	conversion of energy types	26	transformation of energy from one form to another
			6	energy conversions	27	transformation of energy from one form to another
			10	conversion of energy	35	construct simple circuits
			15	conversion of energy from one form to another	36	series circuit
			15	types and forms of energy	36	simple circuits
			16	conversion of energy from one form to another	37	parallel circuit
			31	basic forms of energy—heat	37	series circuit
			46	how infrared light is used in real life	37	simple circuits
			47	how infrared is used in technology		
			130	basic forms of energy		
			131	conversion of energy from potential to kinetic		
			148	forms of energy (i.e. wind)		
			149	conversions of energy		
			150	energy conversions		
			196	electric circuits		
			235	Doppler effect		
			248	white light is a mixture of colors		

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			250	wavelength and frequency of visible light	
			252	electromagnetic spectrum	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.4.7.C 7	Physical Science, Chemistry, and Physics	Identify and explain the principles of force and motion.	4	speed	8	determine the speed of an object
			6	speed	8	measurement and calculation of speed
			34	speed	9	determine speed of an object
			35	understand and calculate speed	9	speed calculation
			40	understand concept of speed	10	speed calculation
			54	concept of speed	13	concept of speed
			55	compare and contrast speed and velocity	15	calculate speed of a moving object
			55	speed	22	calculate speed
			56	speed	27	calculate speed of a moving object
			56	compare and contrast speed and velocity	31	calculate speed of the car
			60	calculating speed	44	wavelength and frequency and speed of waves
			64	position vs. time graphs	44	wave as oscillation in a medium
			64	calculating speed		
			65	speed vs. time graph		
			66	speed vs. time graph		
			66	calculations for speed		
			66	compare and contrast speed and velocity		
			69	speed vs. time graph		
			75	speed		

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			76	speed	
			76	position vs time graphs	
			177	concept of speed	
			225	waves transmit energy	
			226	frequency and amplitude and wavelength of waves	
			227	the speed of waves	
			234	speed of sound	
			235	sound as a wave	
			235	wavelength and frequency	
			236	sound waves and different media	
			236	sound as a wave	
			237	wavelength of sound	
			240	why sound is a wave	
			242	sound as a wave	
			254	how the human eye sees light	
			261	mirrors reflect light	
			263	reflection of light	
			264	reflection explained	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page	
3.4.7.D 7	Physical Science, Chemistry, and Physics	Describe essential ideas about the composition and structure of the universe and the earth's place in it.	156	orbits of planets and moons and other bodies	32	orbit of the moon
			157	describe orbits of planets		
			157	role of gravity in solar system		
			158	orbit of moon		
			158	role of gravity in universe		
			158	moon reflects light		
			164	other bodies in solar system		
			164	orbits of other bodies in the solar system		
			164	how astronomical instruments help us understand the universe		
			165	compare Earth to other planets with respect to supporting life		
			166	classify and compare planets		
			166	astronomical instruments help us understand units		
			166	compare orbits of planets		
			166	compare planets to Earth		
			167	classify and compare planets		

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			168	classify planets	
			168	compare other planets with Earth with respect to supporting life	
			169	classify planets	
			169	orbits of moons	
			169	compare other planets to Earth with respect to supporting life	
			170	classify and compare planets	
			170	orbits of other moons	
			171	theories of origin of universe	
			171	compare orbits of planets in solar system	
			171	compare and classify planets	
			171	how astronomical instruments help us understand universe	
			172	classify planets	
			172	astronomical instruments help us understand universe	
			173	orbits on bodies in solar system	

Correlation to Pennsylvania Academic Standards for Science

CPO Science Physical Science (Middle School)

Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text page		Volume 2 Investigation Manual page
			173	astronomical instruments used to understand universe	
			173	classify planets	
			173	compare Earth to other planets with respect to supporting life	
			175	explain and diagram the structure of the Sun	
			176	compare the Sun to other stars	
			176	explain how stars form and features of life cycle	
			178	explain how stars produce energy	
			178	how stars produce energy	
			182	how astronomical instruments increase our understanding of universe	
			183	how astronomical instruments have increased our knowledge of universe	
			184	structure of sun	
			286	Earth compared with other planets with respect to supporting life	