

**Correlation to Pennsylvania Academic Standards for Science
CPO Science Earth Science (Middle School)
Student Text and Investigation Manual**

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.	36 36 38 50 52 52 52 87 99 190 200 208 392 430	15 19 25 31 35 46 98 102 110 120
			<p>interactions—within all living and non-living matter and energy interact</p> <p>understand and use the concept of a system</p> <p>understand that changes in scale influence characteristics of a system</p> <p>concept of system</p> <p>examples of systems and questions about them</p> <p>plan and conduct an experiment</p> <p>systems</p> <p>identify parts of a system</p> <p>identify and describe parts of solar system</p> <p>changes in scale influence characteristics</p> <p>identify a system as a collection of structures and processes</p> <p>concept of system</p> <p>parts of a system found in nature</p> <p>interactions in systems result in changes in position</p>	<p>investigate a river system</p> <p>investigate a convection system</p> <p>create and study a water cycle system model</p> <p>create a compression chamber system</p> <p>create and study land and water systems</p> <p>observing water current systems</p> <p>investigate river systems</p> <p>investigate system of land erosion</p> <p>investigate ecosystems</p> <p>solar system modeling</p>

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3.1.7.B 7	Unifying Themes	Describe the use of models as an application of scientific or technological concepts.	39 39 39 41 42 43 44 45 51 52 52 74 268 394 444	9 33 36 43 51 67 69 113 116 120 127 136 166 167
			graphical models understand that scientific knowledge is often in the form of models creating and using an algebraic model making graphs from data making graphical model from data how to make graphical model from data making graphical model from data constructing a graph constructing graphical models making graphs scientific knowledge is often in the form of models making and interpreting graphs scientific knowledge in form of models create and evaluate graph construct and evaluate data from graphical model	constructing and evaluating a graphical model constructing a graph from atmospheric pressure data constructing and evaluating graphical models from data construct graphical model from data and evaluate construct and evaluate a quantitative graphical model creating and evaluating graphical model from data science is often in the form of models construct and evaluate graphical models renewable resources design models construct graphical model from data and evaluate construct graphical model from data and evaluate lab notebook making graphs

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Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
			470 understand science is often in the form of mathematical models	

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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.	99 100 113 113 146 399 403 407 408 409 409 409 410 411	61 117 118 119 138
			compare Earth's atmosphere with other planets	61 how sedimentary rocks are formed
			comparison of Earth's atmosphere to other planets	117 orbits of moon and planets
			compare Earth with other planets with respect to supporting life	118 orbits of moons and other planets
			compare orbits of planets	119 orbits of planets
			adaptations of animals to different environments	138 orbits of planets
			compare planets	
			orbits of moons and planets	
			classifying planets	
			what makes Earth capable of supporting life	
			compare Earth to Mars in relation to supporting life	
			classify and compare planets	
			classifying the planets	
			compare planets	
			compare orbits of planets in solar system	

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412			compare Earth to other planets with respect to supporting life	
412			comparing planets	
415			orbits of other bodies in the solar system	
416			other bodies in solar system	
418			compare orbits of planets and other bodies in solar system	
418			compare planets	
419			compare planets	
420			compare planets	
420			Earth is unique to support life	
423			orbits of planets and moons	
424			orbits of planets in solar system	
425			compare orbits of planets and moon	
430			explain orbit of Earth	

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Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
3.1.7.D 7	Unifying Themes	Explain scale as a way of relating concepts and ideas to one another by some measure.	<p>23 English and metric ruler</p> <p>24 English and metric rulers</p> <p>26 metric rulers</p> <p>35 rulers</p> <p>38 understand that changes in scale influence characteristics of a system</p> <p>190 changes in scale influence characteristics</p>	<p>10 metric rulers</p> <p>12 rulers</p> <p>122 relative sizes of object</p> <p>123 relative sizes of object</p> <p>125 metric and English rulers</p> <p>152 metric and English rulers</p> <p>153 metric rulers</p> <p>154 metric rulers</p> <p>155 metric rulers</p> <p>157 thermometers</p> <p>158 rulers</p>

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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.	16 39 114 235 246 247 248 253 254 267 268 269 273 318 384 404 423	44 49 56 58 59 80 81 87 117 119 124 127 131 132 133 133
			plate tectonics creating and using an algebraic model explain relationship between Earth, Sun, and patterns of seasons behavior of Earth's crust theory of plate tectonics plate tectonics explains surface features of Earth plate tectonics plate tectonics plate tectonics plate tectonics plate tectonics plate tectonics plate tectonics plate tectonics how human activity affects renewable and nonrenewable resources Earth's rotation and patterns of day and night relationship of sun and Earth	calculate speed climate change over time and what it would do to currents calculate speed calculate speed speed calculations plate tectonics plate tectonics theory of plate tectonics relationship between sun and Earth and day and night relationship between sun and Earth relationship between sun and Earth and days phases of the moon how Sun and Earth distances cause seasons Earth and Sun positions causing seasons Sun and Earth positions and their relationship with seasons relationship between Earth sun and light

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Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
			423 relationship of Earth and moon	137 appearance of moon
			424 relationship of Earth and sun	138 appearance of the moon
			426 giant impact theory	
			428 tides and Earth and moon's relationship	
			430 interactions in systems result in changes in position	
			430 patterns of day and night and years	
			432 phases of the moon	
			433 phases of moon	
			434 lunar eclipses	
			435 solar eclipses	
			435 solar eclipses	
			435 solar eclipses	
			436 seasons and relationship between Earth and sun	
			437 identify seasons	
			445 identify seasons	

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3.2.7.A 7	Inquiry and Design	Explain and apply scientific and technological knowledge.	4 describe the steps of the scientific method 5 specify implications for future research 6 trace contributions of Marie Curie 8 describe the steps of the scientific method 9 observation—senses help to develop awareness of events or objects and their properties 10 observing—using senses to develop an awareness of events or objects and their properties 11 describe the steps of the scientific method 13 observing and using observations 14 describe steps of the scientific method 16 recognize the repeatability of data is necessary for validation of evidence 18 implications for further research 18 steps of the scientific method	5 recognize that repeatability is necessary 7 repeatability of investigations is necessary 9 collaboration and peer review 47 design scientific investigations 125 recognize repeatability of investigations is necessary for verification of evidence

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Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
			25 trace the development of measurement	
			40 design scientific experiments	
			52 steps of scientific method	
			72 trace development of an invention	
			100 why is Earth's atmosphere different from other planets	
			200 trace development of cartography	
			201 trace the development of cartography	
			209 trace development of a theory	
			218 trace the history of a theory	
			224 trace history of a theory	
			247 steps of scientific theory	
			298 trace development of invention	
			366 what is in your tap water	
			400 contributions of Galileo	
			430 development of calendar	

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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.	4 making a hypothesis 8 make testable hypothesis 10 interpreting observations and proposing explanations 11 writing a procedure in your notebook 13 making hypothesis 15 revise explanations based on observational evidence 15 cause and effect relationships 15 formulate testable hypothesis 15 example lab report including procedure 20 interpreting observation and proposing explanations 21 making testable hypothesis 21 make a sample lab notebook page 22 interpreting observations and posing explanations 24 measurements—including appropriate tools and units 25 measurements—units	1 measuring 4 measuring including use of appropriate tools 5 formulate hypothesis 6 testing explanations against observations 6 make hypothesis 6 conducting scientific inquiry by asking questions and formulating hypotheses 9 recognizing and controlling variables 10 measuring and choosing tools 11 measuring 13 measuring 14 metric and English rulers 20 interpret observations 21 contruction reasonable explanations based on direct and indirect data 22 make predictions based on observations 23 measure volumes of regular and irregular solids 24 make predictions based on observations

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Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
			25	32
			understand length measurements in English and metric units	writing a procedure for constructing a pointer for an aneroid barometer
			26	34
		measurement	evaluating your aneroid barometer design	
		26	understand length measurements in metric units	34
		length measurements	identifying relationships between air pressure and weather	
		26	make measurements with precision	36
		units of force	make predictions based on observed data	
		27	measurement—choosing appropriate units	36
		measurements of length—appropriate units	interpret observations	
		28	measure volume of regular solid objects	47
		mass measurements	design scientific investigations	
		28	measure volume with a variety of methods	48
		kg and g of mass	make predictions	
		30	finding volume of solids	50
		SI and English length measurements	formulate testable hypothesis	
		31	measurement—including correct units	51
		understand time measurements	construct reasonable explanations based on scientific evidence	
				53
				interpret observations and propose explanations
				57
				make predictions based on data
				63
				make predictions based on inferences
				63
				make predictions from data
				63
				interpret observations

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			36	64
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			37	66
			37	67
			40	68
			40	68
			41	72
			43	73
			45	74
			48	78
			49	81
			50	82
			50	84
			50	87
			50	88
			51	90
			51	95

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				96
			52	97
			52	99
			52	100
			68	100
			77	102
			114	112
			150	113
			180	114
			205	116
			209	116
			211	116
			213	119
			218	120
			219	121
			220	121
			298	122

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			345	123
			372	124
			373	125
			394	127
			407	129
			444	129
				133
				149
				152
				152
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				160
				measure volume of regular solids
				161
				measuring
				161
				measure volume of regular objects
				162
				measure volume of irregular objects
				164
				mass in kg and gm
				165
				mass in kg and gm
				166
				observation

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3.2.7.C 7	Inquiry and Design	Identify and use the elements of scientific inquiry to solve problems.	10 13 15 15 15 15 19 19 20 22 22 22 22 30 30 35	3 4 6 6 8 9 9 20 20 20 20 26 34 34 36 40 47
			<p>interpreting observations and proposing explanations</p> <p>making diagrams</p> <p>cause and effect relationships</p> <p>formal lab report</p> <p>revise explanations based on observational evidence</p> <p>communication—written</p> <p>writing up scientific results</p> <p>communicating is key to scientific process</p> <p>interpreting observation and proposing explanations</p> <p>writing up scientific results</p> <p>explaining through discussion</p> <p>making sketches</p> <p>interpreting observations and posing explanations</p> <p>written communication</p> <p>making sketches</p> <p>communication written</p>	<p>bar graphs</p> <p>bar graph</p> <p>testing explanations against observations</p> <p>conducting scientific inquiry by asking questions and formulating hypotheses</p> <p>graphs</p> <p>recognizing and controlling variables</p> <p>line graphs</p> <p>interpret observations</p> <p>communication</p> <p>diagrams</p> <p>drawings and sketches</p> <p>creating sketches and diagrams</p> <p>evaluating your aneroid barometer design</p> <p>identifying relationships between air pressure and weather</p> <p>interpret observations</p> <p>create line graphs</p> <p>design scientific investigations</p>

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				53
			37	58
			40	62
			40	63
			40	64
			41	64
			41	67
			42	68
			43	69
			43	78
			44	80
			45	81
			45	84
			50	90
			50	95
			51	96
			52	99
				99
				100

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			57	103
			71	104
			110	114
			114	116
			114	116
			127	149
			150	150
			180	150
			180	151
			209	151
			211	167
			213	167
			218	167
			219	168
			220	168
			224	168
			237	
			243	
			266	
			268	

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			281 communication	
			298 sketches	
			298 making an oral presentation of scientific objects	
			372 interpreting observation and proposing explanations	
			376 explaining	
			377 making sketches	
			394 recognize controlling variables	
			407 revising explanations based on evidence	
			429 communicating written scientific notation	
			444 proposing explanations	
			444 create line graph	
			471 effectively conveying written info is essential to science	

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3.2.7.D 7	Inquiry and Design	Know and use the technological design process to solve problems.	30 dimensional drawings 194 creating dimensional sketches 200 creating dimensional drawings 222 dimensioned drawings 222 modify tested solution and document change in performance	99 dimensioned drawings 120 design models

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Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
3.5.7.A 7	Earth Sciences	Describe earth features and processes.	54 225 228 229 230 231 232 233 234 237 238 239 241 242 293 312 392 393	69 70
			inner structure of Earth diagram inner structure of Earth diagram inner Earth diagram structure of Earth diagram inner structure of Earth diagram and explain structure of inner Earth Earth's inner structure diagram inner structure of Earth diagram inner structure of Earth diagram of structure of inner Earth structures of inner Earth structure of inner Earth Earth's structure structure of inner Earth inner structure of Earth inner workings of volcano inner structure of Earth inner structure of Earth	model Earth model inner layers of Earth

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3.5.7.B 7	Earth Sciences	Recognize earth resources and how they affect everyday life.	108 291 305 320 321 322 341 349	104 105 109 112
			how people affect Earth's atmosphere volcanoes occur at subduction zones economic usage of quartz economic importance of minerals economic importance of diamond how humans activities affect resources how humans affect soil resources	draw conclusions about effects of human activity on resources draw conclusions about effects of human activity on resources renewable and non-renewable resources make inferences and draw conclusions about effects of human activity on renewable and nonrenewable resources
			108 291 305 320 321 322 341 349	
			350 356	
			350 356	
			361 362	
			365	
			how humans activities affect resources how human activity affects soil and water resources human impact on soil draw conclusions about human activity on Earth's resources effects of human activity on water	

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Standard #: by end of grade	Category	Standard Statement	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
			371 human effects on natural resources	
			375 effects of human activity on natural resources	
			376 how human activity affects natural resources	
			378 conclusions about human activity and effects on Earth's resources	
			379 how human activity affects resources—renewable and nonrenewable	
			387 how human activity affects renewable and nonrenewable resources	
			472 how humans activities affect resources	

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3.5.7.C 7	Earth Sciences	Describe basic elements of meteorology.	74 know the rate of solar radiation 99 components of Earth's atmosphere 102 atmospheric pressure and how it changes with altitude 103 techniques for atmospheric measurement 105 effect of elevation on climate 105 water vapor as part of the atmosphere 107 fate of incoming solar radiation 108 fate of incoming solar radiation 108 greenhouse conditions on Earth 111 incoming solar radiation 111 fate of incoming solar radiation 111 weather and climate are based on heat transfer 112 know rate of solar radiation 112 relationships between Earth's rotation and currents	30 describe techniques for atmospheric measurement 30 changes in weather 31 make a barometer for air pressure readings 38 use techniques for atmospheric measurement 39 use techniques for atmospheric measurement 40 describe changes in weather 41 techniques of atmospheric measurement 42 causes for tornadoes 44 hurricanes 45 investigate ocean currents 48 differential heating causes circulation of currents 49 climate change over time and what it would do to currents 50 investigate wave speed

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113			differing greenhouse conditions on Earth, Mars, and Venus	
116			tools (planes) for atmospheric measurement	
116			hurricanes	
117			hurricanes	
117			techniques for atmospheric measurement	
117			differential heating of oceans	
117			how oceans affect weather	
122			changes in and causes for weather	
122			weather involves transfer of energy	
122			large scale movement of air and how it affects weather	
122			differential heating of Earth causes circulation	
123			large movements of air	
124			know the relationship between rotation of Earth and the circular motion of air currents	
124			Coriolis effect	

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124			how differential heating of Earth causes air movements	
125			how air movement affects weather	
125			Coriolis effect	
125			effect of latitude on climate	
125			differential heating of Earth results in circulation of air	
126			water cycle related to weather	
126			how water cycle affects weather	
126			movement of air affects weather	
128			how climate is related to transfer of energy	
129			types of precipitation based on dewpoint	
129			water vapor as part of atmosphere	
130			describe changes in weather (i.e. clouds)	
131			reasons for changes in weather	
131			water vapor as part of atmosphere	

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132			changes in weather	
132			different forms of precipitation	
132			how water cycle relates to weather	
133			large scale movement of air causes weather changes	
133			changes in weather	
134			movement of air affects weather	
134			reasons for changes in weather	
134			things that affect climate and weather	
135			differential heating of Earth leads to distribution of heat	
135			weather is due to energy transfer	
135			Coriolis effect	
136			causes of severe weather	
137			changes in weather and causes for storms	
137			know weather is the result of energy transfers	
137			water cycle affects weather	

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137			Coriolis effect	
137			movement of air affects weather	
138			reasons for tornadoes	
138			know weather has to do with energy transfer	
139			effect on climate of ocean currents	
139			how oceans affect weather including El Nino	
141			movement of air affects climate	
141			effects of latitude and elevation and topography and proximity to water on climate	
141			water affects climates	
141			know effects on climate of altitude, latitude, topography, and bodies of water	
141			oceans affect climate	
142			fate of incoming solar radiation	
142			know that climate is based on energy transfer	

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142			interaction of wind, ocean currents, and mountains results in distribution of biomes	
143			mountains affect climate	
143			water affects temperature	
144			latitudes and distribution of biomes	
145			distribution of deserts and rain forests because of oceans	
145			latitudes affect where biomes occur	
148			describe techniques for atmospheric observation	
149			tools used to measure atmosphere	
158			movements of air affect weather patterns	
158			oceans affect climate	
158			how water cycle relates to weather patterns	
159			effects of climate based on warm or cold ocean currents	
159			interaction of wind patterns and ocean currents	
159			ocean currents	

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159			Coriolis effect	
160			ocean currents	
178			ocean currents	
179			ocean currents	
183			Coriolis effect	
390			significance of greenhouse effect	
408			greenhouse conditions on Venus	
436			relative amount of solar radiation	

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3.5.7.D 7	Earth Sciences	Explain the behavior and impact of the earth's water systems.	46 46 46 47 82 82 83 83 86 87 87 87 88 88 88 90 92	25 25 26 26 45 57 61 98 98 100 100 116
			how groundwater figures into water cycle water cycle importance of water to society	explain relationship between solar energy and precipitation and rivers and oceans water cycle model
			importance of water to society	understand relationship between solar energy and water cycle
			importance of water to society	
			different types of water on Earth	water cycle model
			groundwater	differences between fresh and salty water
			water is important for life	major attributes of marine environments
			different forms of water on Earth	
			different forms of water on Earth	how rock cycle is related to erosion
			water cycle	attributes of rivers
			groundwater	explain how water is related to erosion
			relationship between sun and precipitation	attributes of rivers
			importance of water to people	water cycle related to erosion
			groundwater	water cycle
			water cycle and types of water on Earth	
			describe the water cycle	
			water cycle and types of water	

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92			how water cycle is related to erosion	
92			sea caves	
93			water cycle is related to erosion	
98			nitrogen and oxygen and other gases as components of atmosphere	
99			relationships between sun and water cycle	
130			water cycle and types of water on Earth	
131			types of water on Earth	
132			types of water	
142			relationship between solar energy and precipitation	
156			how sun and oceans interact	
156			why oceans are salty	
157			describe oceans	
158			relationship between sun and oceans	
167			describe the attributes of marine environments	
168			how water cycle is related to erosion	

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168			features of a marine environment	
171			describe features of marine environment	
172			how water is cycle is related to erosion	
172			features of marine environments	
173			features of marine environments—continental shelf	
175			how water cycle is related to erosion	
175			features of the ocean floor	
176			attributes of marine environments	
178			attributes of marine environments	
198			describe marine environments	
209			explain how water cycle is related to erosion	
327			water cycle related to erosion	
328			water related to weathering	
333			attributes of rivers	

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333			how water cycle is related to erosion	
334			water cycle related to erosion	
335			how water cycle is related to erosion	
337			water cycle related to erosion	
343			how water cycle relates to erosion	
344			water cycle related to erosion	
344			features of water environments—rivers	
345			water cycle related to erosion	
347			describe features of a stream	
364			how oceans get salty	
364			origins and effects of water pollution	
364			how water cycle is related to erosion	
365			water is important to people	
365			various forms of water (i.e. surface water)	

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366			importance of water to society	
366			water cycle	
367			importance of water analysis	
368			importance of water to society	
388			students know importance of water to society	
388			origins and effects of water pollution	
388			describe water cycle	