

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.1.1 Physics	Skills and Processes	The student will explain why curiosity, honesty, openness, and skepticism are highly regarded in science.	The student will recognize that real problems have more than one solution and decisions to accept one solution over another are made on the basis of many issues.	10 what is a model 23 science helps us learn about natural world	67 explain what happened 86 what could you do to change the performance of the generator you built? 87 build different generators
1.1.2 Physics	Skills and Processes	The student will explain why curiosity, honesty, openness, and skepticism are highly regarded in science.	The student will modify or affirm scientific ideas according to accumulated evidence.	10 what is a model 10 what is a model 22 discovery of Penicillin 22 Fleming's investigations 167 history of atomic theory 218 atomic theory 219 development of atom models	6 reflecting on the experiment 7 construct explanations supported by evidence 9 how do your observations support your answer? 11 what experimental data support answer? 47 construct a reasonable explanation 52 find a percentage 60 propose a relationship between power and voltage

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page			
1.1.3 Physics	Skills and Processes	The student will explain why curiosity, honesty, openness, and skepticism are highly regarded in science.	The student will critique arguments that are based on faulty, misleading data or on the incomplete use of numbers.	11	importance of units	each investigation contains a "thinking about what you observed" section, and students must be able to communicate and defend their findings from the investigation		
				11	communicating via measurement			
				26	applying your knowledge: three opportunities to research topics and write reports			
				132	explain your answer using diagrams		3	car launching technique is a possible source of error
				132	applying your knowledge: two opportunities to research topics and write reports		4	car launching technique is a possible source of error
				163	applying your knowledge: two opportunities to research topics and write reports		21	how close is your prediction to the actual measurement?
				295	applying your knowledge: three opportunities to research topics and write reports		26	spotting the landing point of the marble is tricky
				27	marble launching technique is a possible source of error			

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.1.4 Physics	Skills and Processes	The student will explain why curiosity, honesty, openness, and skepticism are highly regarded in science.	The student will recognize data that are biased.	56 analyze a speed/distance graph	<p>1 collect accurate, precise data with electronic timer</p> <p>3 car launching technique is a possible source of error</p> <p>4 car launching technique is a possible source of error</p> <p>6 predict fastest car</p> <p>7 collect precise data</p> <p>15 predict speed of car</p> <p>21 predict speed of car</p> <p>21 how close is your prediction to the actual measurement?</p> <p>26 spotting the landing point of the marble is tricky</p> <p>27 how can photogate ensure consistent results?</p> <p>27 marble launching technique is a possible source of error</p> <p>30 predict temperature of mixture</p> <p>45 predict how many bounces the car will make</p> <p>47 analyze the results</p> <p>52 find a percentage</p>

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
					78 estimate the precision of measurements 96 make predictions about natural frequency 154 analyze gear ratio data
1.1.5 Physics	Skills and Processes	The student will explain why curiosity, honesty, openness, and skepticism are highly regarded in science.	The student will explain factors that produce biased data (incomplete data, using data inappropriately, conflicts of interest, etc.).	11 importance of units 11 communicating via measurement 26 applying your knowledge: three opportunities to research topics and write reports 132 explain your answer using diagrams 132 applying your knowledge: two opportunities to research topics and write reports 163 applying your knowledge: two opportunities to research topics and write reports 295 applying your knowledge: three opportunities to research topics and write reports	each investigation contains a "thinking about what you observed" section, and students must be able to communicate and defend their findings from the investigation

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator		Volume One Student Text Page	Volume Two Investigation Manual Page
1.2.1 Physics	Skills and Processes	The student will pose scientific questions and suggest investigative approaches to provide answers to questions.	The student will identify meaningful, answerable scientific questions.	4 8 8 8	what is an experiment designing experiments hypothesis defined asking a scientific question	47 design an experiment 94 design pendulum experiments
1.2.2 Physics	Skills and Processes	The student will pose scientific questions and suggest investigative approaches to provide answers to questions.	The student will pose meaningful, answerable scientific questions.(NTB)	4 8 8 8	what is an experiment designing experiments hypothesis defined asking a scientific question	47 design an experiment 94 design pendulum experiments
1.2.3 Physics	Skills and Processes	The student will pose scientific questions and suggest investigative approaches to provide answers to questions.	The student will formulate a working hypothesis.	8	formulating a hypothesis	6 form a hypothesis 30 state a hypothesis about the water's energy 94 state a hypothesis about period of pendulum 96 state a hypothesis about the natural frequency of the oscillator

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.2.4 Physics	Skills and Processes	The student will pose scientific questions and suggest investigative approaches to provide answers to questions.	The student will test a working hypothesis.(NTB)	6 what is a variable 8 scientific method 8 control and experimental variables 8 dependent variables 8 independent variables 16 graphs and dependent variables 16 graphs and independent variables 22 scientific method in action 24 importance of changing one variable at a time in an experiment	6 recognize and control variables 27 identify and control variables 94 investigate variables and how they affect the period of a pendulum

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.2.5 Physics	Skills and Processes	The student will pose scientific questions and suggest investigative approaches to provide answers to questions.	The student will select appropriate instruments and materials to conduct an investigation.	305 using a multimeter to measure current 307 using a multimeter to measure resistance	2 using timers and photogates 6 design a better experiment 13 design other experiments 15 design another experiment 44 using a timer and photogates 46 using a timer and photogates 47 conduct the experiment you designed 59 use a multimeter 61 using a multimeter to measure resistance 62 use a multimeter to measure current 63 use a multimeter to measure resistance of a pot 64 use a multimeter to measure voltage drop 65 use a multimeter to measure voltage 66 use a multimeter to measure current 74 use a multimeter to measure voltage

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
					85 use a multimeter to measure voltage 86 use a timer and photogate to measure speed of rotor 93 use a timer and photogate to measure the period of a pendulum 96 use a timer and photogate to measure the natural frequency of an oscillator
1.2.6 Physics	Skills and Processes	The student will pose scientific questions and suggest investigative approaches to provide answers to questions.	The student will identify appropriate methods for conducting an investigation (independent and dependent variables, proper controls, repeat trials, appropriate sample size, etc.).	6 what is a variable 8 scientific method 8 control and experimental variables 8 dependent variables 8 independent variables 16 graphs and dependent variables 16 graphs and independent variables 22 scientific method in action 24 importance of changing one variable at a time in an experiment	6 recognize and control variables 27 identify and control variables 94 investigate variables and how they affect the period of a pendulum

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page	
1.2.7 Physics	Skills and Processes	The student will pose scientific questions and suggest investigative approaches to provide answers to questions.	The student will use relationships discovered in the lab to explain phenomena observed outside the laboratory.	4	applying natural laws	112 research how computer monitors and televisions make colros 161 making a model maglev train
				4	understanding natural laws	
				22	unexpected discoveries	
				23	science is a creative enterprise	
				53	relationship between science and technology	
				78	rocket technology	
				79	new technologies	
				104	prosthetic legs and technology	
				122	maglev train technology	
				186	creativity and discoveries of Charles Goodyear	
				213	deep water submarine technology	
				235	technology and archaeology	
				273	how a smoke detector works	
				458	recording sound	
532	applications of polarization					

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.2.8 Physics	Skills and Processes	The student will pose scientific questions and suggest investigative approaches to provide answers to questions.	The student will defend the need for verifiable data.	11 importance of units 11 communicating via measurement 26 applying your knowledge: three opportunities to research topics and write reports 132 explain your answer using diagrams 132 applying your knowledge: two opportunities to research topics and write reports 163 applying your knowledge: two opportunities to research topics and write reports 295 applying your knowledge: three opportunities to research topics and write reports	each investigation contains a "thinking about what you observed" section, and students must be able to communicate and defend their findings from the investigation 67 explain what happened 154 create a report

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.3.1 Physics	Skills and Processes	The student will carry out scientific investigations effectively and employ the instruments, systems of measurement, and materials of science appropriately.	The student will develop and demonstrate skills in using lab and field equipment to perform investigative techniques.(NTB)	171 how a thermometer works 305 using a multimeter to measure current 307 using a multimeter to measure resistance	2 using timers and photogates 22 use spring scales 44 using a timer and photogates 46 using a timer and photogates 59 use a multimeter 61 using a multimeter to measure resistance 62 use a multimeter to measure current 63 use a multimeter to measure resistance of a pot 64 use a multimeter to measure voltage drop 65 use a multimeter to measure voltage 66 use a multimeter to measure current 74 use a multimeter to measure voltage 85 use a multimeter to measure voltage 86 use a timer and photogate to measure speed of rotor

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
					93 use a timer and photogate to measure the period of a pendulum 96 use a timer and photogate to measure the natural frequency of an oscillator
1.3.2 Physics	Skills and Processes	The student will carry out scientific investigations effectively and employ the instruments, systems of measurement, and materials of science appropriately.	The student will recognize safe laboratory procedures.		16 safety with simple machines 48 demonstrate safe lab practices 67 short circuits and lab safety 70 capacitor safety
1.3.3 Physics	Skills and Processes	The student will carry out scientific investigations effectively and employ the instruments, systems of measurement, and materials of science appropriately.	The student will demonstrate safe handling of the chemicals and materials of science.(NTB)		16 safety with simple machines 48 demonstrate safe lab practices 67 short circuits and lab safety 70 capacitor safety

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.3.4 Physics	Skills and Processes	The student will carry out scientific investigations effectively and employ the instruments, systems of measurement, and materials of science appropriately.	The student will learn the use of new instruments and equipment by following instructions in a manual or from oral direction.(NTB)	171 how a thermometer works 305 using a multimeter to measure current 307 using a multimeter to measure resistance	2 using timers and photogates 22 use spring scales 44 using a timer and photogates 46 using a timer and photogates 59 use a multimeter 61 using a multimeter to measure resistance 62 use a multimeter to measure current 63 use a multimeter to measure resistance of a pot 64 use a multimeter to measure voltage drop 65 use a multimeter to measure voltage 66 use a multimeter to measure current 74 use a multimeter to measure voltage 85 use a multimeter to measure voltage 86 use a timer and photogate to measure speed of rotor

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
					93 use a timer and photogate to measure the period of a pendulum 96 use a timer and photogate to measure the natural frequency of an oscillator

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page		
1.4.1 Physics	Skills and Processes	The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication.	The student will organize data appropriately using techniques such as tables, graphs, and webs	16 16 25 46 48 56 112 419 420	constructing graphs steps to follow for graph construction constructing a graph motion graphs motion graphs analyze a speed/distance graph using a graph to find force vector components harmonic motion graphs finding the amplitude on a harmonic motion graph	4 6 8 9 10 11 13 15 18 19 20 21 22 25 25 27 29 29	construct a graph use a data table constant force data table constant height data table speed data table create a graph collision data table graph speed vs. height output and input work data table force vs. distance data table graph work done vs. deflection of rubber band graph speed vs. rubber band deflection force data table rolling friction data table graph friction vs. mass graph launch angle vs. range graph acceleration vs. steepness ratio speed and height data table

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
					45 make a graph of efficiency vs. speed 47 analyze the results 50 graph time vs. temperature 52 construct a graph 75 graph current vs. time for the capacitor 86 graph voltage vs. speed 94 sketch harmonic motion graphs 154 create a data table 154 analyze gear ratio data

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page		
1.4.2 Physics	Skills and Processes	The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication.	The student will analyze data to make predictions, decisions, or draw conclusions.	16	constructing graphs	4	construct a graph
				16	steps to follow for graph construction	6	reflecting on the experiment
				25	constructing a graph	7	construct explanations supported by evidence
				46	motion graphs	9	how do your observations support your answer?
				48	motion graphs	11	what experimental data support answer?
				56	analyze a speed/distance graph	11	create a graph
				112	using a graph to find force vector components	15	graph speed vs. height
				419	harmonic motion graphs	20	graph work done vs. deflection of rubber band
				420	finding the amplitude on a harmonic motion graph	21	graph speed vs. rubber band deflection
						25	graph friction vs. mass
		27	graph launch angle vs. range				
		29	graph acceleration vs. steepness ratio				
		45	make a graph of efficiency vs. speed				
		47	construct a reasonable explanation				
		47	analyze the results				
		50	graph time vs. temperature				

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
					52 construct a graph 60 propose a relationship between power and voltage 61 collect and record resistance data 75 graph current vs. time for the capacitor 86 graph voltage vs. speed 94 sketch harmonic motion graphs 154 analyze gear ratio data

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.4.3 Physics	Skills and Processes	The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication.	The student will use experimental data from various investigators to validate results.		<p>1 collect accurate, precise data with electronic timer</p> <p>3 car launching technique is a possible source of error</p> <p>4 use photogate A to monitor repeatability</p> <p>4 car launching technique is a possible source of error</p> <p>7 collect precise data</p> <p>21 how close is your prediction to the actual measurement?</p> <p>26 spotting the landing point of the marble is tricky</p> <p>27 practice your technique until it is repeatable</p> <p>27 marble launching technique is a possible source of error</p> <p>27 how can photogate ensure consistent results?</p> <p>78 estimate the precision of measurements</p>

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page		
1.4.4 Physics	Skills and Processes	The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication.	The student will determine the relationships between quantities and develop the mathematical model that describes these relationships.	19	mathematical descriptions	11	find formula for acceleration
				26	interpreting distance/time graph	13	derive a formula
				34	mathematical model of acceleration	17	calculate mechanical advantage
				35	Newton's second law equation	17	derive a formula to use with ropes and pulleys
				41	average speed equation	29	find a mathematical name for the steepness ratio
				43	calculating weight	29	calculate the ratio
				61	momentum equation	31	calculate temperature of mixture
				62	relating impulse and momentum conservation	69	calculate power used by the bulb
				68	kinetic energy formula	75	derive a formula to calculate the charge
				86	the work equation	76	calculate the number of electrons
				89	the power equation	99	calculate natural frequency and period
				96	calculating mechanical advantage	154	calculate gear ratio
				118	Hooke's law equation		
				141	projectile motion problems		
				143	calculating angular speed		
				144	finding the circumference of a circle		
				145	linear speed equation		
				153	equation for law of universal gravitation		
179	the heat equation						

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page	
				193	density formula	
				208	pressure and temperature relationship	
				308	equation for Ohm's law	
				342	equation for Coulomb's law	
				438	calculating wave speeds	
				439	equation for the speed of a wave	
				525	equation for the speed of light	

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page		
1.4.5 Physics	Skills and Processes	The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication.	The student will check graphs to determine that they do not misrepresent results.	16	constructing graphs	4	construct a graph
				16	steps to follow for graph construction	11	create a graph
				25	constructing a graph	15	graph speed vs. height
				46	slope of a position vs. time graph	20	graph work done vs. deflection of rubber band
				46	motion graphs	21	graph speed vs. rubber band deflection
				48	motion graphs	25	graph friction vs. mass
				50	slope of a speed vs. time graph	27	graph launch angle vs. range
				112	using a graph to find force vector components	29	investigate slope
				419	harmonic motion graphs	29	graph acceleration vs. steepness ratio
				420	finding the amplitude on a harmonic motion graph	45	make a graph of efficiency vs. speed
				50	graph time vs. temperature		
				52	construct a graph		
				75	graph current vs. time for the capacitor		
				86	graph voltage vs. speed		
				94	sketch harmonic motion graphs		

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.4.6 Physics	Skills and Processes	The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication.	The student will describe trends revealed by data.	56 analyze a speed/distance graph	47 analyze the results 154 analyze gear ratio data
1.4.7 Physics	Skills and Processes	The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication.	The student will determine the sources of error that limit the accuracy or precision of experimental results.	10 what is a model	3 car launching technique is a possible source of error 4 car launching technique is a possible source of error 21 how close is your prediction to the actual measurement? 26 spotting the landing point of the marble is tricky 27 marble launching technique is a possible source of error
1.4.8 Physics	Skills and Processes	The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication.	The student will use models and computer simulations to extend his/her understanding of scientific concepts.(NTB)	19 mathematical models	

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.4.9 Physics	Skills and Processes	The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication.	The student will use analyzed data to confirm, modify, or reject a hypothesis.		<p>6 reflecting on the experiment</p> <p>7 construct explanations supported by evidence</p> <p>9 how do your observations support your answer?</p> <p>11 what experimental data support answer?</p> <p>47 construct a reasonable explanation</p> <p>52 find a percentage</p> <p>60 propose a relationship between power and voltage</p>

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page	
1.5.1 Physics	Skills and Processes	The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation.	The student will demonstrate the ability to summarize data (measurements/observations).	11	importance of units	each investigation contains a "thinking about what you observed" section, and students must be able to communicate and defend their findings from the investigation computer spreadsheets and graphing software can be used throughout the curriculum for data analysis and presentation 6 use a data table 8 constant force data table 9 constant height data table 10 speed data table 13 collision data table 18 output and input work data table 19 force vs. distance data table 22 force data table 25 rolling friction data table 29 speed and height data table 150 using computer spreadsheets
				11	communicating via measurement	
				26	applying your knowledge: three opportunities to research topics and write reports	
				132	explain your answer using diagrams	
				132	applying your knowledge: two opportunities to research topics and write reports	
				163	applying your knowledge: two opportunities to research topics and write reports	
				295	applying your knowledge: three opportunities to research topics and write reports	

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
					154 create a report 154 create a data table
1.5.2 Physics	Skills and Processes	The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation.	The student will explain scientific concepts and processes through drawing, writing, and/or oral communication.	11 importance of units 11 communicating via measurement 26 applying your knowledge: three opportunities to research topics and write reports 132 explain your answer using diagrams 132 applying your knowledge: two opportunities to research topics and write reports 163 applying your knowledge: two opportunities to research topics and write reports 295 applying your knowledge: three opportunities to research topics and write reports	each investigation contains a "thinking about what you observed" section, and students must be able to communicate and defend their findings from the investigation 153 draw a schematic diagram 154 create a report

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.5.3 Physics	Skills and Processes	The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation.	The student will use computers and/or graphing calculators to produce the visual materials (tables, graphs, and spreadsheets) that will be used for communicating results.(NTB)		computer spreadsheets and graphing software can be used throughout the curriculum for data analysis and presentation 150 using computer spreadsheets

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page		
1.5.4 Physics	Skills and Processes	The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation.	The student will use tables, graphs, and displays to support arguments and claims in both written and oral communication.	16	constructing graphs	4	construct a graph
				16	steps to follow for graph construction	6	use a data table
				25	constructing a graph	8	constant force data table
				46	motion graphs	9	constant height data table
				48	motion graphs	10	speed data table
				112	using a graph to find force vector components	11	create a graph
				419	harmonic motion graphs	13	collision data table
				420	finding the amplitude on a harmonic motion graph	15	graph speed vs. height
						18	output and input work data table
						19	force vs. distance data table
		20	graph work done vs. deflection of rubber band				
		21	graph speed vs. rubber band deflection				
		22	force data table				
		25	rolling friction data table				
		25	graph friction vs. mass				
		27	graph launch angle vs. range				
		29	graph acceleration vs. steepness ratio				
		29	speed and height data table				

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
					45 make a graph of efficiency vs. speed 50 graph time vs. temperature 52 construct a graph 75 graph current vs. time for the capacitor 86 graph voltage vs. speed 94 sketch harmonic motion graphs 154 create a report 154 create a data table
1.5.5 Physics	Skills and Processes	The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation.	The student will create and/or interpret graphics. (scale drawings, photographs, digital images, field of view, etc.)		153 draw a schematic diagram

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.5.6 Physics	Skills and Processes	The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation.	The student will read a technical selection and interpret it appropriately.	28 52 52 79 166 167 218 219	Newton and the history of physics contributions of Harold Edgerton history of high-speed photography contributions of Robert Goddard Robert Brown and Brownian motion history of atomic theory atomic theory development of atom models
1.5.7 Physics	Skills and Processes	The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation.	The student will use, explain, and/or construct various classification systems.	6 10 240	5 investigate systems and change

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.5.8 Physics	Skills and Processes	The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation.	The student will describe similarities and differences when explaining concepts and/or principles.	11 importance of units 11 communicating via measurement 26 applying your knowledge: three opportunities to research topics and write reports 132 explain your answer using diagrams 132 applying your knowledge: two opportunities to research topics and write reports 163 applying your knowledge: two opportunities to research topics and write reports 295 applying your knowledge: three opportunities to research topics and write reports	each investigation contains a "thinking about what you observed" section, and students must be able to communicate and defend their findings from the investigation 67 explain what happened

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.5.9 Physics	Skills and Processes	The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation.	The student will communicate conclusions derived through a synthesis of ideas.		6 reflecting on the experiment 7 construct explanations supported by evidence 9 how do your observations support your answer? 11 what experimental data support answer? 47 construct a reasonable explanation 60 propose a relationship between power and voltage 154 create a report
1.6.1 Physics	Skills and Processes	The student will use mathematical processes.	The student will use ratio and proportion in appropriate situations to solve problems.	15 setting up unit conversions 46 slope of a position vs. time graph 50 slope of a speed vs. time graph	29 investigate slope
1.6.2 Physics	Skills and Processes	The student will use mathematical processes.	The student will use computers and/or graphing calculators to perform calculations for tables, graphs, or spreadsheets.(NTB)		computer spreadsheets and graphing software can be used throughout the curriculum for data analysis and presentation 150 using computer spreadsheets

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.6.3 Physics	Skills and Processes	The student will use mathematical processes.	The student will express and/or compare small and large quantities using scientific notation and relative order of magnitude.	15 setting up unit conversions	

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page		
1.6.4 Physics	Skills and Processes	The student will use mathematical processes.	The student will manipulate quantities and/or numerical values in algebraic equations.	19 26 34 35 41 43 61 62 68 86 89 96 118 141 143 144 145 153 179	mathematical descriptions interpreting distance/time graph mathematical model of acceleration Newton's second law equation average speed equation calculating weight momentum equation relating impulse and momentum conservation kinetic energy formula the work equation the power equation calculating mechanical advantage Hooke's law equation projectile motion problems calculating angular speed finding the circumference of a circle linear speed equation equation for law of universal gravitation the heat equation	11 13 17 17 29 29 31 69 75 76 99 154	find formula for acceleration derive a formula calculate mechanical advantage derive a formula to use with ropes and pulleys find a mathematical name for the steepness ratio calculate the ratio calculate temperature of mixture calculate power used by the bulb derive a formula to calculate the charge calculate the number of electrons calculate natural frequency and period calculate gear ratio

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
				193	
				density formula	
				208	
				pressure and temperature relationship	
				308	
				equation for Ohm's law	
				342	
				equation for Coulomb's law	
				438	
				calculating wave speeds	
				439	
				equation for the speed of a wave	
				525	
				equation for the speed of light	

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.6.5 Physics	Skills and Processes	The student will use mathematical processes.	The student will judge the reasonableness of an answer.	10 what is a model	<p>3 car launching technique is a possible source of error</p> <p>4 car launching technique is a possible source of error</p> <p>6 reflecting on the experiment</p> <p>7 construct explanations supported by evidence</p> <p>9 how do your observations support your answer?</p> <p>11 what experimental data support answer?</p> <p>21 how close is your prediction to the actual measurement?</p> <p>26 spotting the landing point of the marble is tricky</p> <p>27 marble launching technique is a possible source of error</p> <p>47 construct a reasonable explanation</p> <p>52 find a percentage</p> <p>60 propose a relationship between power and voltage</p>

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page	
1.7.1 Physics	Skills and Processes	The student will show that connections exist both within the various fields of science and among science and other disciplines including mathematics, social studies, language arts, fine arts, and technology.	The student will apply the skills, processes, and concepts of biology, chemistry, physics, or earth science to societal issues.	23 23 186 234 274	impact of medical breakthroughs impact of medical breakthroughs connection to chemistry: extraordinary materials indirect evidence and archaeology cook or chemist?	48 connection to chemistry
1.7.2 Physics	Skills and Processes	The student will show that connections exist both within the various fields of science and among science and other disciplines including mathematics, social studies, language arts, fine arts, and technology.	The student will identify and evaluate the impact of scientific ideas and/or advancements in technology on society.	23 72 104 122	impact of medical breakthroughs energy usage and conservation prosthetic legs and technology maglev train technology	112 research how computer monitors and televisions make colros 161 making a model maglev train

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.7.3 Physics	Skills and Processes	The student will show that connections exist both within the various fields of science and among science and other disciplines including mathematics, social studies, language arts, fine arts, and technology.	The student will describe the role of science in the development of literature, art, and music.(NTB)	471 harmonics and instruments 488 the CMYK color process 489 the RGB color process	102 harmonics and standing wave patterns 109 harmonics and musical instruments 111 investigate the RGB model of color 112 investigate the CMYK model of color

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.7.4 Physics	Skills and Processes	The student will show that connections exist both within the various fields of science and among science and other disciplines including mathematics, social studies, language arts, fine arts, and technology.	The student will recognize mathematics as an integral part of the scientific process.(NTB)	19 mathematical descriptions 19 mathematical models 26 interpreting distance/time graph 34 mathematical model of acceleration 35 Newton's second law equation 41 average speed equation 43 calculating weight 61 momentum equation 62 relating impulse and momentum conservation 68 kinetic energy formula 86 the work equation 89 the power equation 96 calculating mechanical advantage 118 Hooke's law equation 141 projectile motion problems 143 calculating angular speed 144 finding the circumference of a circle 145 linear speed equation 153 equation for law of universal gravitation	11 find formula for acceleration 13 derive a formula 17 calculate mechanical advantage 17 derive a formula to use with ropes and pulleys 29 find a mathematical name for the steepness ratio 29 calculate the ratio 31 calculate temperature of mixture 69 calculate power used by the bulb 75 derive a formula to calculate the charge 76 calculate the number of electrons 99 calculate natural frequency and period 154 calculate gear ratio

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
				179	
				the heat equation	
				193	
				density formula	
				208	
				pressure and temperature relationship	
				308	
				equation for Ohm's law	
				342	
				equation for Coulomb's law	
				438	
				calculating wave speeds	
				439	
				equation for the speed of a wave	
				525	
				equation for the speed of light	

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.7.5 Physics	Skills and Processes	The student will show that connections exist both within the various fields of science and among science and other disciplines including mathematics, social studies, language arts, fine arts, and technology.	The student will investigate career possibilities in the various areas of science.(NTB)	53 science and photography 104 connection to life science: prosthetic legs and technology 105 science and biomechanics 129 science and architecture 186 materials scientists 212 connection to life science: deep water submarine 234 archaeologists 254 energy in the ocean 312 electric circuits in your body 515 recording images 516 retinal implants	111 connection to life science: photoreceptors in the eye

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.7.6 Physics	Skills and Processes	The student will show that connections exist both within the various fields of science and among science and other disciplines including mathematics, social studies, language arts, fine arts, and technology.	The student will explain how development of scientific knowledge leads to the creation of new technology and how technological advances allow for additional scientific accomplishments.	53 relationship between science and technology 78 rocket technology 79 new technologies 104 prosthetic legs and technology 122 maglev train technology 213 deep water submarine technology 235 technology and archaeology 273 how a smoke detector works 458 recording sound 532 applications of polarization	112 research how computer monitors and televisions make colros 161 making a model maglev train
5.1.1 Physics	Concepts of Physics	The student will know and apply the laws of mechanics to explain the behavior of the physical world.	The student will use analytical techniques appropriate to the study of physics.	61 momentum is calculated with velocity – not speed 110 compare and contrast scalars and vectors 111 force vectors 111 force vectors 112 resolving vectors 115 finding resultant vector 115 finding resultant vector 136 working with velocity vector	23 use force vectors 23 use force vectors

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page		
5.1.2 Physics	Concepts of Physics	The student will know and apply the laws of mechanics to explain the behavior of the physical world.	The student will use algebraic and geometric concepts to qualitatively and quantitatively describe an object's motion.	17	speed of light	3	find the speed of the car
				17	speed defined	6	how can speed be measured?
				17	nothing in the universe stays still	7	measure the speed
				17	comparing speeds	9	why did the speed change?
				18	calculating speed	10	find speed of car
				18	speed units	21	measure speed of car
				19	velocity defined	25	calculate speed of car
				32	acceleration defined	26	investigate projectile motion
				33	acceleration and velocity	44	experiment and find average speed
				39	calculations pertaining to free fall	46	measure speed of car
				39	effect of gravity on motion	53	investigate frames of reference
				40	velocity defined	54	identify frame of reference
				45	terminal speed		
				45	skydiving and terminal speed		
				52	acceleration shown through strobe photography		
				56	calculate speed from distance/time graph		
				88	work and gravity		
110	compare and contrast scalars and vectors						
136	speed vs. velocity						

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
				136	
				working with velocity vector	
				137	
				projectile explained	
				138	
				free fall component of a trajectory	
				143	
				angular speed	
				402	
				gravitational field	

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
5.1.3 Physics	Concepts of Physics	The student will know and apply the laws of mechanics to explain the behavior of the physical world.	The student will analyze and explain how Newton's Laws describe changes in an object's motion.	28 force defined 29 mass and inertia 29 Newton's first law 30 units of force 31 net force explained 35 Newton's second law 35 quantitative understanding of second law 36 applying Newton's second law properly 36 balanced and unbalanced forces 37 net force and second law calculating 37 using second law formula 43 weight vs. mass 43 calculating weight from mass 44 weight vs. mass 45 effects of air resistance 52 action-reaction pairs 59 Newton's third law 60 sorting out force pairs 78 third law and rockets	8 investigate Newton's first law of motion 9 research and define inertia and weight and mass 10 investigate Newton's second law of motion 11 investigate net force 12 investigate Newton's 3rd law of motion 13 relate Newton's 3rd law of motion to car collisions 22 when net force is zero 23 Newton's second law of motion 24 investigate effect of friction 25 apply Newton's second law of motion 29 apply Newton's second law of motion 95 Newton's 2nd law of motion and natural frequency

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
				94	
				friction and machines	
				101	
				friction explained	
				116	
				when net force is zero	
				117	
				Newton's third law and springs	
				119	
				cause of friction	
				119	
				friction explained	
				120	
				static and sliding friction	
				122	
				reducing friction	
				123	
				useful friction	
				128	
				the third law and physics of walls	
				158	
				Newton's third law and helicopters	
				418	
				friction and damping	
				424	
				Newton's second law and oscillators	

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page		
5.1.4 Physics	Concepts of Physics	The student will know and apply the laws of mechanics to explain the behavior of the physical world.	The student will analyze the behavior of forces.	45	effects of air resistance	23	draw a free body diagram
				62	understanding impulse	24	investigate effect of friction
				76	impulse and practical problem solving		
				86	calculating work		
				88	calculating work		
				89	calculating power		
				90	maximum power output of a person		
				94	friction and machines		
				101	friction explained		
				113	using a free-body diagram		
				119	friction explained		
				119	cause of friction		
				120	static and sliding friction		
				122	reducing friction		
				123	useful friction		
				153	Newton's law of universal gravitation explained		
				244	power explained		
				245	three ways to look at power		
				250	power in human technology		
252	power in natural systems						

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
				254 tidal power 254 wave power 418 friction and damping	
5.1.5 Physics	Concepts of Physics	The student will know and apply the laws of mechanics to explain the behavior of the physical world.	The student will analyze systems with regard to the conservation laws.	10 conservation of energy 63 law of conservation of momentum 64 using momentum conservation to solve problems 74 momentum and collisions 77 momentum and car safety 240 energy and systems 243 energy flow diagrams 251 energy flow in natural systems	13 apply the law of conservation of momentum 42 model how atoms exchange energy 45 describe energy changes 46 investigate energy flow in a system 47 draw an energy flow diagram 57 draw energy flow diagram of the circuit

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
5.2.1 Physics	Concepts of Physics	The student will know and apply the laws of electricity and magnetism and explain their significant role in nature and technology.	The student will describe the types of electric charges and the forces that exist between them.	340 understanding electric charge 341 what causes shocks 341 charged objects and static electricity 342 understanding Coulomb's law 350 how capacitors work 351 capacitors and current 351 charging a capacitor 352 measuring capacitance 354 understanding lightning 361 using magnetic forces 404 the electric field	70 investigate capacitors 72 investigate the nature of electric charge 75 calculate charge stored in capacitor 89 understand and investigate electric and gravitational fields

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
5.2.2 Physics	Concepts of Physics	The student will know and apply the laws of electricity and magnetism and explain their significant role in nature and technology.	The student will describe the sources and effects of electric and magnetic fields.	299 electric circuits 299 examples of electric circuits in nature 300 circuit diagrams 301 open and closed circuits 301 battery circuits 308 Ohm's law 318 series circuits 321 Ohm's law and voltage drops 325 comparing series and parallel circuits 326 understanding short circuits 330 alternating current 330 direct current 360 what is a magnet 361 using magnetic forces 362 magnetic fields 363 magnetic field lines 364 right-hand rule 364 electromagnets 365 building an electromagnet 366 diamagnetic materials 366 paramagnetic materials	57 open and closed circuits 57 build circuits 58 investigate conductors and insulators 59 draw and interpret circuit diagrams 60 a circuit with a dimmer switch 62 investigate Ohm's law 63 use Ohm's law 64 investigating voltage drops 65 build a circuit with three bulbs and a switch 65 investigate series circuits 66 investigate series circuits 67 understand why short circuits are dangerous 67 investigate short circuits and learn how to avoid 67 Ohm's law and short circuits 68 compare series and parallel circuits 69 construct a simple circuit 75 work with Ohm's law

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
				374 magnets and MRI scanners	77 investigate the strength of magnetic force
				380 effect of current on a compass	79 investigate interactions of different materials with magnets
				381 magnetic field of a wire	81 compare electromagnet and permanent magnet
				387 electromagnetic induction explained	85 investigate electromagnetic induction
				389 how a generator works	87 investigate how generators work
				404 the electric field	88 investigate magnetic fields
				522 electromagnetic waves	89 understand and investigate electric and gravitational fields
					90 use magnetic fields to solve a puzzle
5.2.3 Physics	Concepts of Physics	The student will know and apply the laws of electricity and magnetism and explain their significant role in nature and technology.	The student will qualitatively describe the applications of electromagnetic induction.	364 electromagnets	83 build a simple electric motor
				365 building an electromagnet	84 build an electric motor and perform experiments
				385 how an electric motor works	85 investigate electromagnetic induction
				386 how a battery-powered electric motor works	87 investigate how generators work
				387 electromagnetic induction explained	
				389 how a generator works	

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
5.3.1 Physics	Concepts of Physics	The student will recognize and relate the laws of thermodynamics to practical applications.	The student will relate thermodynamics to the balance of energy in a system.	172 kinetic theory and temperature 174 phase changes 175 absolute zero 176 understanding the difference between heat and temperature 176 flow of thermal energy is heat 177 heat and work 178 specific heat explained 181 heat conduction 181 thermal equilibrium 183 natural and forced convection 184 thermal radiation 185 heat transfer is everywhere 242 generation of heat from frictional motion	30 investigating heat transfer 30 investigate difference between temperature and heat 32 investiate concept of specific heat

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
5.4.1 Physics	Concepts of Physics	The student will explain and demonstrate how vibrations and waves provide a model for our understanding of various physical phenomena.	The student will compare qualitatively how waves are propagated and transmit energy.	434 waves transmit energy 435 how to recognize waves 436 longitudinal waves 436 transverse waves 440 standing waves on a vibrating string 447 waves and energy 459 sound waves and different media	98 study waves on a string 99 explore transverse waves 100 study water waves 124 relating transverse waves on a spring to light waves

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
5.4.2 Physics	Concepts of Physics	The student will explain and demonstrate how vibrations and waves provide a model for our understanding of various physical phenomena.	The student will describe wave characteristics using both diagrams and calculations.	414 a pendulum's cycle 414 understanding a cycle 416 frequency explained 416 period is the time for one cycle 417 frequency is the inverse of period 418 amplitude explained 430 identify period and frequency and cycle and amplitude 437 frequency and amplitude and wavelength of waves 438 the speed of waves 456 speed of sound 461 wavelength of sound 468 pitch and the musical scale 483 color and light 524 energy and color of light	92 explore the meaning of amplitude 92 explore the meaning of cycle 92 explore harmonic motion using a pendulum 93 measure the period of a pendulum 94 investigate harmonic motion with a pendulum 101 investigate standing waves and frequency 123 measure wavelengths of visible light using a spectrometer 123 how colors of light relate to frequency and wavelength

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
5.4.3 Physics	Concepts of Physics	The student will explain and demonstrate how vibrations and waves provide a model for our understanding of various physical phenomena.	The student will qualitatively describe the physical behaviors of waves.	415 sound is a wave 426 resonance explained 442 reflected waves 442 refracted waves 443 absorption explained 443 diffraction explained 454 sound is a wave 457 understanding the Doppler effect 458 how sound is recorded 459 sound is a wave 463 standing waves and resonance 482 reflection of light 482 refraction of light 482 refraction of light 499 mirrors reflect light 501 reflection explained 503 index of refraction 503 understanding refraction 503 understanding refraction 504 angles of incidence and refraction 504 angles of incidence and refraction	103 explore the concept of resonance 104 properties of sound waves 105 investigate sound wave interference 113 use a mirror to observe reflected light 114 use a prism to investigate light rays 115 investigate refraction 119 investigate lenses and magnification 120 using a mirror to reflect light 120 investigate reflection of light 121 investigate refraction of light 121 investigate refraction of light 121 use a lens to refract light 122 investigate diffraction of light 125 explore polarization of light 126 explore the concept of polarization of light

Correlation to Maryland Core Learning Goals: Science

CPO Science Physics: A First Course

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
				512 magnification 528 diffraction and light 529 interference of light waves 530 diffraction gratings and spectrometers 531 polarization	
5.5.1 Physics	Concepts of Physics	The student will investigate certain topics in modern physics.	The student will cite evidence of the wave/particle duality in the nature of matter.	280 meaning of Einstein's formula 284 theory of special relativity	53 explore the concept of relativity 55 a thought experiment on Einstein's theories
5.5.2 Physics	Concepts of Physics	The student will investigate certain topics in modern physics.	The student will qualitatively explain the processes associated with nuclear energy and its applications.	221 weak force explained 222 radioactive decay 267 nuclear reactions explained 268 nuclear reactions and energy 269 fusion reactions 270 fission reactions 270 radioactive materials	