Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.1.1 Science	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.	17	the search for scientific knowledge	3	inquiry and optical illusions
				18	scientific theories and facts	5	scientific evidence and sound
				20	learning physics through inquiry	38	designing an experiment
				22	the nature of scientific knowledge	92	explain the physics of a diver's somersaults
				33	problems in the real world use both metric and English units	105	how does sound get through tiny cracks?
				74	strobe photography	146	explain how polarizing sunglasses work
				95	antilock braking systems	191	propose solutions that will work for each disk
				102	applications of Newton's first law		
				112	examples of Newton's third law in the real world		
				126	reducing friction and hovercraft and maglev trains		
				127	friction is useful for brakes and tires		
				131	jack-in-the-box uses a spring		
				134	design of structures		
				135	conceptual design for a bridge		
				140	examples of scalars		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	152	kicked soccer ball acts as a projectile launched at an angle	
	153	hang time	
	155	example of gymnast for forces applied at an angle	
	160	robot navigation application	
	161	inertial navigation system	
	166	examples of objects moving in a circle	
	169	speedometers and odometers	
	171	centripetal force at the amusement park	
	177	satellite motion application	
	178	HEO and geostationary orbit	
	189	SUV rollovers and center of gravity	
	194	bicycle physics application	
	249	accident reconstruction	
	254	angular momentum of skater spinning and diver	
	256	gyroscopes and angular momentum	
	272	why airplanes have tails	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	284	examples of waves	
	312	stereo sound	
	321	understanding human hearing	
	345	glow-in-the-dark plastic	
	359	rainbows are an example of dispersion	
	369	the compound microscope	
	387	polarized sunglasses and LCD computer screens	
	412	breakdown voltage and lightning	
	420	holiday lights wired in series	
	423	why aren't birds electrocuted?	
	432	paying for electricity	
	435	wiring application	
	435	circuits in your house	
	440	charge of everyday objects	
	452	almost all electric appliances use capacitors	
	455	cameras use capacitors to supply energy for flash bulbs	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	470	how does a compass work?	
	480	where coils are used	
	484	electromagnet in a toaster	
	549	windchill factor	
	582	deep water submarine Alvin application	
	621	exposure to UV radiation	
	644	proof of Einstein's theory of general relativity	
	645	astronomers find black holes by what is around them	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.1.2 Science	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.	25	putting forth ideas and then testing them	18	what do the results tell you?
				46	why accuracy and precision are important	24	how do you measured positions compare to model?
				50	graphs are a way of representing data	24	compare calculation with graph estimate
				51	using a graphical model to make a prediction and checking the model's accuracy	50	how does the measurement compare to your prediction?
				52	recognizing patterns using graphs	50	test your prediction
				268	understanding graphs of harmonic motion	50	what would happen if...?
				319	frequency spectrum	74	as mechanical advantage increases what happens to length of pulled string?
				326	comparison of wave forms from guitar sounds	77	where does the marble move the fastest?
				328	explain why hearing can be damaged by loud sounds	78	what does the graph tell you?
				329	decibel level vs. frequency graph for human hearing	92	explain your observations
				345	using glow-in-the-dark plastic to demonstrate photon energy levels	94	analyze data
				445	charge by friction	100	explain how force applied causes the response
				449	diagramming electric fields using field lines	103	explain why higher tension makes waves move faster
						105	explain how wind might cause big waves in water

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
				465	diagramming magnetic fields using magnetic field lines	124	explain how the colored filters work
				501	current vs.voltage graph for a transistor	127	do your observations support this hypothesis?
						132	are there differences between your prediction and measurement?
						153	what conclusions can you draw?
						154	analyze data and explain a rule
						154	did battery voltage change?
1.1.3 Science	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.	25	putting forth ideas and then testing them	8	significant digit practice
				46	accuracy and precision of measurements	50	follow the scientific method
				46	why accuracy and precision are important	50	test your prediction
				52	recognizing patterns and cause and effect relationships	77	where does the marble move the fastest?
				345	using glow-in-the-dark plastic to demonstrate photon energy levels	103	what effect does changing the tension have?
				445	charge by friction	127	do your observations support this hypothesis?

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.1.4 Science	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.	46	why accuracy and precision are important	50	discuss sources of error
				49	writing procedures in a lab notebook helps make sure your results are repeatable	52	discuss sources of errors
				49	controlling variables in experiments	142	communicate your findings

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.1.5 Science	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.).	46	why accuracy and precision are important	24	how do you measured positions compare to model?
				49	writing procedures in a lab notebook helps make sure your results are repeatable	24	compare calculation with graph estimate
				51	using a graphical model to make a prediction and checking the model's accuracy	41	calculate percent difference
				51	checking a graphical model's accuracy	42	calculate percent difference
				125	evaluating perpetual motion claims	50	calculate percent difference
				319	frequency spectrum	50	how does the measurement compare to your prediction?
						95	calculate percent error
						110	reliability of a double-blind test
						110	did the method give an accurate result?
						132	are there differences between your prediction and measurement?
						142	communicate your findings

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.2.1 Science	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.	20	inquiry is a process of learning by asking questions		each investigation begins with a Key Question
				264	finding a basic cycle of harmonic motion	50	perform experiment
				478	an experiment with a wire and compass	77	investigate motion on a roller coaster
				485	building an electromagnet with wire and a nail	80	investigate motion on a roller coaster
				489	experiment demonstrating electromagnetic induction	94	design an experiment
						102	what is it that moves in the case of a wave?

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.2.2 Science	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)	20	inquiry is a process of learning by asking questions	50	follow the scientific method
				33	problems in the real world use both metric and English units	50	perform experiment
				49	control and experimental variables	77	investigate motion on a roller coaster
				50	dependent and independent variables in graphs	80	investigate motion on a roller coaster
				74	strobe photography	92	explain the physics of a diver's somersaults
				95	antilock braking systems	94	determine which variable has the greatest effect
				102	applications of Newton's first law	94	dependent and independent variables
				112	examples of Newton's third law in the real world	102	what is it that moves in the case of a wave?
				126	reducing friction and hovercraft and maglev trains	105	how does sound get through tiny cracks?
				127	friction is useful for brakes and tires	146	explain how polarizing sunglasses work
				131	jack-in-the-box uses a spring	194	variables that affect the performance of the generator
				134	design of structures		
				140	examples of scalars		
				152	kicked soccer ball acts as a projectile launched at an angle		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	153	hang time	
	155	example of gymnast for forces applied at an angle	
	160	robot navigation application	
	161	inertial navigation system	
	166	examples of objects moving in a circle	
	169	speedometers and odometers	
	171	centripetal force at the amusement park	
	177	satellite motion application	
	178	HEO and geostationary orbit	
	189	SUV rollovers and center of gravity	
	194	bicycle physics application	
	249	accident reconstruction	
	254	angular momentum of skater spinning and diver	
	256	gyroscopes and angular momentum	
	264	finding a basic cycle of harmonic motion	
	272	why airplanes have tails	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	273	changing the natural frequency of a stretched rubber band	
	284	examples of waves	
	312	stereo sound	
	321	understanding human hearing	
	345	glow-in-the-dark plastic	
	359	rainbows are an example of dispersion	
	369	the compound microscope	
	387	polarized sunglasses and LCD computer screens	
	389	Einstein and theory of special relativity	
	412	breakdown voltage and lightning	
	420	holiday lights wired in series	
	423	why aren't birds electrocuted?	
	432	paying for electricity	
	435	wiring application	
	435	circuits in your house	
	440	charge of everyday objects	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
				452	almost all electric appliances use capacitors		
				455	cameras use capacitors to supply energy for flash bulbs		
				470	how does a compass work?		
				478	an experiment with a wire and compass		
				480	where coils are used		
				484	electromagnet in a toaster		
				485	building an electromagnet with wire and a nail		
				489	experiment demonstrating electromagnetic induction		
				549	windchill factor		
				582	deep water submarine Alvin application		
				621	exposure to UV radiation		
1.2.3 Science	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.	17	hypotheses and the importance of experiments	57	formulate a hypothesis
						77	form a hypothesis
						91	write a hypothesis

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.2.4 Science	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)	20	inquiry is a process of learning by asking questions	29	set up the ultimate pulley
				25	putting forth ideas and then testing them	50	test your prediction
				345	using glow-in-the-dark plastic to demonstrate photon energy levels	77	where does the marble move the fastest?
				445	charge by friction	80	set up the straight track
				454	making a simple capacitor	97	select appropriate technology to make measurements
						97	design and test a way to increase natural frequency
						102	what is it that moves in the case of a wave?
						127	do your observations support this hypothesis?
						150	choose circuit parts to light a bulb

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.2.5 Science	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.	32	measuring distance	7	estimating length
				34	understanding metric rulers	8	measuring a pencil
				36	reading a digital timer	10	using the DataCollector
				46	accuracy and precision of measurements	10	using photogate
				46	accuracy and precision of measurements	11	accuracy and resolution and printing
				113	the force platform	12	using devices to measure mass
				405	using a multimeter to measure voltage	14	using the DataCollector and velocity sensor
				407	measuring current with an ammeter or multimeter	25	use the DataCollector and velocity sensor
				409	using a multimeter to measure resistance	27	use the DataCollector and velocity sensor
				454	making a simple capacitor	29	set up the ultimate pulley
				454	making a simple capacitor	29	set up the ultimate pulley
				526	Celsius and Fahrenheit thermometers	44	using a compass
				527	how thermometers work	47	use the DataCollector and photogates
						50	measure the distance
						50	measure and record the distance
						51	use a spring scale
						59	use the DataCollector and photogate
						70	measure input and output forces

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page	Volume Two Investigation Manual Page
		70 use a spring scale
		77 use the DataCollector and photogate
		80 use the DataCollector and photogate
		80 set up the straight track
		80 measure vertical distance
		80 set up the straight track
		90 use meter stick to measure height
		94 measure the length of the string
		94 use the DataCollector and photogate
		97 select appropriate technology to make measurements
		97 design and test a way to increase natural frequency
		97 design and test a way to increase natural frequency
		100 use photogate and DataCollector to measure the period
		102 use a spring scale to measure tension of string
		106 use the DataCollector to measure frequency

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page	Volume Two Investigation Manual Page
		130 use a laser and mirror to study law of reflection 130 study reflection with a mirror 134 use mirrors and lenses to learn how images are formed 136 use a laser to locate images formed by a lens 150 choose circuit parts to light a bulb 152 use a multimeter to measure current 153 use a multimeter to measure voltage 157 use a multimeter to measure current and voltage 162 use a multimeter 164 use the multimeter 184 reading a compass 191 use a multimeter 192 use a multimeter to measure voltage 193 use a multimeter 194 use a photogate and DataCollector 198 use a multimeter

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
						200	use a multimeter
						212	measure the temperature
						226	check the pressure with your gauge
						226	use a digital balance
1.2.6 Science	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.).	49	writing lab procedures	50	follow the scientific method
				49	control and experimental variables	50	write a procedure
				50	dependent and independent variables in graphs	50	perform experiment
				264	finding a basic cycle of harmonic motion	77	investigate motion on a roller coaster
				273	changing the natural frequency of a stretched rubber band	80	investigate motion on a roller coaster
				478	an experiment with a wire and compass	94	determine which variable has the greatest effect
				485	building an electromagnet with wire and a nail	94	dependent and independent variables
				489	experiment demonstrating electromagnetic induction	194	variables that affect the performance of the generator

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.2.7 Science	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.	17	the search for scientific knowledge	3	inquiry and optical illusions
				18	scientific theories and facts	5	scientific evidence and sound
				20	learning physics through inquiry	38	designing an experiment
				22	the nature of scientific knowledge	92	explain the physics of a diver's somersaults
				33	problems in the real world use both metric and English units	105	how does sound get through tiny cracks?
				74	strobe photography	146	explain how polarizing sunglasses work
				95	antilock braking systems		
				102	applications of Newton's first law		
				112	examples of Newton's third law in the real world		
				126	reducing friction and hovercraft and maglev trains		
				127	friction is useful for brakes and tires		
				131	jack-in-the-box uses a spring		
				134	design of structures		
				140	examples of scalars		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	152	kicked soccer ball acts as a projectile launched at an angle	
	153	hang time	
	155	example of gymnast for forces applied at an angle	
	160	robot navigation application	
	161	inertial navigation system	
	166	examples of objects moving in a circle	
	169	speedometers and odometers	
	171	centripetal force at the amusement park	
	176	the orbits of planets and comets	
	177	satellite motion application	
	178	HEO and geostationary orbit	
	189	SUV rollovers and center of gravity	
	194	bicycle physics application	
	233	output power from plants is input power for animals	
	249	accident reconstruction	
	254	angular momentum of skater spinning and diver	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	256	gyroscopes and angular momentum	
	265	examples of oscillators	
	272	why airplanes have tails	
	281	wing-beat cycle of a hummingbird	
	284	examples of waves	
	312	stereo sound	
	321	understanding human hearing	
	345	glow-in-the-dark plastic	
	359	rainbows are an example of dispersion	
	369	the compound microscope	
	387	polarized sunglasses and LCD computer screens	
	412	breakdown voltage and lightning	
	420	holiday lights wired in series	
	423	why aren't birds electrocuted?	
	432	paying for electricity	
	435	circuits in your house	
	435	wiring application	
	440	charge of everyday objects	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	452	almost all electric appliances use capacitors	
	455	cameras use capacitors to supply energy for flash bulbs	
	470	how does a compass work?	
	480	where coils are used	
	484	electromagnet in a toaster	
	549	windchill factor	
	582	deep water submarine Alvin application	
	621	exposure to UV radiation	
	644	proof of Einstein's theory of general relativity	
	645	astronomers find black holes by what is around them	
	646	a standard model for particle physics	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.2.8 Science	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.	49	writing procedures in a lab notebook helps make sure your results are repeatable	110	reliability of a double-blind test
						110	did the method give an accurate result?
				51	checking a graphical model's accuracy	142	present your findings
				125	evaluating perpetual motion claims	142	communicate your findings

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.3.1 Science	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)	34 understanding metric rulers 36 reading a digital timer 113 the force platform 405 using a multimeter to measure voltage 407 measuring current with an ammeter or multimeter 409 using a multimeter to measure resistance 526 Celsius and Fahrenheit thermometers 527 how thermometers work	8 measuring a pencil 10 using the DataCollector 10 using photogate 12 using devices to measure mass 14 using the DataCollector and velocity sensor 25 use the DataCollector and velocity sensor 27 use the DataCollector and velocity sensor 44 using a compass 47 use the DataCollector and photogates 50 measure the distance 51 use a spring scale 59 use the DataCollector and photogate 70 use a spring scale 77 use the DataCollector and photogate 80 use the DataCollector and photogate 90 use meter stick to measure height 94 use the DataCollector and photogate

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page	Volume Two Investigation Manual Page
		100 use photogate and DataCollector to measure the period 102 use a spring scale to measure tension of string 106 use the DataCollector to measure frequency 130 use a laser and mirror to study law of reflection 130 study reflection with a mirror 134 use mirrors and lenses to learn how images are formed 136 use a laser to locate images formed by a lens 152 use a multimeter to measure current 153 use a multimeter to measure voltage 157 use a multimeter to measure current and voltage 162 use a multimeter 164 use the multimeter 184 reading a compass 191 use a multimeter

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
					192 use a multimeter to measure voltage 193 use a multimeter 194 use a photogate and DataCollector 198 use a multimeter 200 use a multimeter 212 measure the temperature 226 check the pressure with your gauge 226 use a digital balance
1.3.2 Science	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.	Lab safety symbols and instructions are found in the investigation manual on the page before TOC	91 safety note 150 safety precautions 152 safety precautions 176 safety note 186 safety note 187 electromagnet safety 218 safety tip 226 gas pressure safety note

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
1.3.3 Science	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)	Lab safety symbols and instructions are found in the investigation manual on the page before TOC	91 safety note 150 safety precautions 152 safety precautions 176 safety note 186 safety note 187 electromagnet safety 218 safety tip 226 gas pressure safety note

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.3.4 Science	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)	34	understanding metric rulers	8	measuring a pencil
				36	reading a digital timer	10	using the DataCollector
				113	the force platform	10	using photogate
				405	using a multimeter to measure voltage	12	using devices to measure mass
				407	measuring current with an ammeter or multimeter	14	using the DataCollector and velocity sensor
				409	using a multimeter to measure resistance	25	use the DataCollector and velocity sensor
				526	Celsius and Fahrenheit thermometers	27	use the DataCollector and velocity sensor
				527	how thermometers work	44	using a compass
						47	use the DataCollector and photogates
						50	measure the distance
						51	use a spring scale
						59	use the DataCollector and photogate
						70	use a spring scale
						77	use the DataCollector and photogate
						80	use the DataCollector and photogate
						90	use meter stick to measure height
						94	use the DataCollector and photogate

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page	Volume Two Investigation Manual Page
		100 use photogate and DataCollector to measure the period 102 use a spring scale to measure tension of string 106 use the DataCollector to measure frequency 130 use a laser and mirror to study law of reflection 130 study reflection with a mirror 134 use mirrors and lenses to learn how images are formed 136 use a laser to locate images formed by a lens 152 use a multimeter to measure current 153 use a multimeter to measure voltage 157 use a multimeter to measure current and voltage 162 use a multimeter 164 use the multimeter 184 reading a compass 191 use a multimeter

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page	Volume Two Investigation Manual Page
		192 use a multimeter to measure voltage 193 use a multimeter 194 use a photogate and DataCollector 198 use a multimeter 200 use a multimeter 212 measure the temperature 226 check the pressure with your gauge 226 use a digital balance

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.4.1 Science	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	50	constructing a graph	18	create a graph
				50	graphs are a way of representing data	18	describe the graph
				51	graphical models	28	record position and time data
				52	recognizing patterns using graphs	41	make a graph
				164	finding x and y components of velocity for model rocket	42	make a graph
				268	understanding graphs of harmonic motion	50	sketch four graphs
				312	the process of digital sound reproduction	65	create a graph
				326	comparison of wave forms from guitar sounds	74	as mechanical advantage increases what happens to length of pulled string?
				329	decibel level vs. frequency graph for human hearing	78	create a graph of speed vs. position
				433	the waveform of AC electricity	78	what does the graph tell you?
				449	diagramming electric fields using field lines	78	record data in table
				465	diagramming magnetic fields using magnetic field lines	83	record data in table
				501	current vs.voltage graph for a transistor	94	analyze data
						94	make three different graphs
						94	create data table for self-designed experiment
						94	record your data in table
						100	sketch a graph
						154	did battery voltage change?

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page	Volume Two Investigation Manual Page
		157 graph voltage vs. current 158 graph voltage vs. current 178 make a graph of voltage vs. time 187 create a graph 195 make a graph of voltage vs. number of magnets 198 make a current vs. voltage graph for the diode

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.4.2 Science	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.	50	constructing a graph	18	create a graph
				51	graphical models	18	what do the results tell you?
				312	the process of digital sound reproduction	18	describe the graph
				328	explain why hearing can be damaged by loud sounds	41	make a graph
				433	the waveform of AC electricity	42	make a graph
						50	sketch four graphs
						50	what would happen if...?
						65	create a graph
						74	as mechanical advantage increases what happens to length of pulled string?
						78	create a graph of speed vs. position
						78	what does the graph tell you?
						92	explain your observations
						94	make three different graphs
						94	analyze data
						100	sketch a graph
						100	explain how force applied causes the response
						103	explain why higher tension makes waves move faster

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
						105	explain how wind might cause big waves in water
						124	explain how the colored filters work
						153	what conclusions can you draw?
						154	analyze data and explain a rule
						154	did battery voltage change?
						157	graph voltage vs. current
						158	graph voltage vs. current
						178	make a graph of voltage vs. time
						187	create a graph
						195	make a graph of voltage vs. number of magnets
						198	make a current vs. voltage graph for the diode
1.4.3 Science	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.	46	why accuracy and precision are important	11	collecting data with precision

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.4.4 Science	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.	82	creating the acceleration formula from experiments	24	uniform acceleration model
				88	developing the formulas for a model of motion with constant acceleration	26	create an algebraic model
						50	create algebraic model
				304	write a formula relating velocity of wave to period and wavelength	58	write a formula
						107	give an equation that describes your observations
				334	light intensity follows an inverse square law	223	Bernoulli's equation

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.4.5 Science	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.	50	graphs are a way of representing data	18	describe the graph
				50	constructing a graph	18	create a graph
				51	graphical models	18	find the slope of the line
				52	recognizing patterns using graphs	41	make a graph
				65	slope of a position vs. time graph	42	make a graph
				85	acceleration and slope of a speed vs. time graph	50	sketch four graphs
				268	understanding graphs of harmonic motion	65	create a graph
				282	analyze graph of an oscillator	78	create a graph of speed vs. position
				312	the process of digital sound reproduction	94	make three different graphs
				326	comparison of wave forms from guitar sounds	100	sketch a graph
				329	decibel level vs. frequency graph for human hearing	157	graph voltage vs. current
				433	the waveform of AC electricity	158	graph voltage vs. current
				449	diagramming electric fields using field lines	178	make a graph of voltage vs. time
				465	diagramming magnetic fields using magnetic field lines	187	create a graph
						195	make a graph of voltage vs. number of magnets
						198	make a current vs. voltage graph for the diode

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
				501	current vs.voltage graph for a transistor		
1.4.6 Science	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.	50	graphs are a way of representing data	74	as mechanical advantage increases what happens to length of pulled string?
				51	using a graph to make predictions	78	what does the graph tell you?
				52	recognizing patterns using graphs	94	analyze data
				52	recognizing relationships between variables from graphs	154	did battery voltage change?
				268	understanding graphs of harmonic motion		
				268	understanding graphs of harmonic motion		
				326	comparison of wave forms from guitar sounds		
				329	decibel level vs. frequency graph for human hearing		
				449	diagramming electric fields using field lines		
				465	diagramming magnetic fields using magnetic field lines		
				501	current vs.voltage graph for a transistor		

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.4.7 Science	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.	46 49	why accuracy and precision are important controlling variables in experiments	8 11 11 50 52 180 180	significant digit practice precision in measurement collecting data with precision discuss sources of error discuss sources of errors make measurement with precision making measurements with precision

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.4.8 Science	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)	50	constructing a graph	18	describe the graph
				51	graphical models	18	create a graph
				51	using a graphical model to make a prediction and checking the model's accuracy	24	compare calculation with graph estimate
						24	uniform acceleration model
				82	creating the acceleration formula from experiments	24	how do you measured positions compare to model?
				88	developing the formulas for a model of motion with constant acceleration	24	model for uniform accelerated motion
				123	a model for friction	26	create an algebraic model
				124	a model for static friction	41	make a graph
				304	write a formula relating velocity of wave to period and wavelength	42	make a graph
						50	sketch four graphs
				312	the process of digital sound reproduction	50	how does the measurement compare to your prediction?
				319	frequency spectrum	50	create algebraic model
				334	light intensity follows an inverse square law	58	write a formula
				352	optics and optical instruments	65	create a graph
				433	the waveform of AC electricity	78	create a graph of speed vs. position
				514	the binary number system and its use in computers	94	make three different graphs
						100	sketch a graph

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page	Volume Two Investigation Manual Page
		107 give an equation that describes your observations 132 are there differences between your prediction and measurement? 157 graph voltage vs. current 158 graph voltage vs. current 178 make a graph of voltage vs. time 187 create a graph 195 make a graph of voltage vs. number of magnets 198 make a current vs. voltage graph for the diode 223 Bernoulli's equation

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.4.9 Science	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.	51	checking a graphical model's accuracy	18	what do the results tell you?
				125	evaluating perpetual motion claims	41	calculate percent difference
				210	perpetual motion machines	42	calculate percent difference
				328	explain why hearing can be damaged by loud sounds	50	calculate percent difference
						50	what would happen if...?
						59	does your experiment provide confirmation?
						78	does this agree with your hypothesis?
						92	explain your observations
						95	calculate percent error
						100	explain how force applied causes the response
						103	explain why higher tension makes waves move faster
						105	explain how wind might cause big waves in water
						110	reliability of a double-blind test
						110	did the method give an accurate result?
						124	explain how the colored filters work

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
						153	what conclusions can you draw?
						154	analyze data and explain a rule
1.5.1 Science	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).	37	making graphs of experimental results over time	28	record position and time data
						50	create four graphs
				49	writing procedures in a lab notebook helps make sure your results are repeatable	78	record data in table
						83	record data in table
						94	create data table for self-designed experiment
				49	writing procedures in a lab notebook helps make sure your results are repeatable	94	record your data in table
						142	present your findings
				50	constructing a graph	142	communicate your findings
				164	finding x and y components of velocity for model rocket	205	display information you found for your element

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.5.2 Science	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.	49	writing procedures in a lab notebook helps make sure your results are repeatable	29	interpret setup diagram
				62	understanding the word "per"	97	draw a sketch of your system
				82	understanding the Greek letter delta	105	sketch the wave fronts
				118	terms of mass and weight	142	communicate your findings
				119	understanding symbols	142	present your findings
				129	drawing free-body diagrams	205	display information you found for your element
				138	draw a free-body diagram		
				147	drawing the velocity vector		
				234	making an energy flow diagram		
				355	drawing a ray diagram		
				364	drawing ray diagrams of lenses		
				402	circuit diagrams and electrical symbols		
				449	drawing the electric field using field lines		
				465	diagramming magnetic fields using magnetic field lines		

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.5.3 Science	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)	37 50	making graphs of experimental results over time constructing a graph	50	create four graphs

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.5.4 Science	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.	50	constructing a graph	18	create a graph
				51	graphical models	18	describe the graph
				51	using a graph to make predictions	28	record position and time data
				52	recognizing relationships between variables from graphs	41	make a graph
						42	make a graph
				164	finding x and y components of velocity for model rocket	50	sketch four graphs
						65	create a graph
				268	understanding graphs of harmonic motion	78	record data in table
						78	create a graph of speed vs. position
				312	the process of digital sound reproduction	83	record data in table
						94	record your data in table
				433	the waveform of AC electricity	94	create data table for self-designed experiment
						94	make three different graphs
						100	sketch a graph
						142	present your findings
						157	graph voltage vs. current
						158	graph voltage vs. current
						178	make a graph of voltage vs. time
						187	create a graph
						195	make a graph of voltage vs. number of magnets

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page
					198 make a current vs. voltage graph for the diode
1.5.5 Science	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.)	129 drawing free-body diagrams 138 draw a free-body diagram 147 drawing the velocity vector 234 making an energy flow diagram 355 drawing a ray diagram 364 drawing ray diagrams of lenses 402 circuit diagrams and electrical symbols 449 drawing the electric field using field lines 465 diagramming magnetic fields using magnetic field lines	29 interpret setup diagram 97 draw a sketch of your system 105 sketch the wave fronts

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.5.6 Science	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.	74	Dr. Harold Edgerton and strobe photography	53	George Atwood (1746-1807)
				84	acceleration of cars	142	research types of electromagnetic waves
				210	perpetual motion machines	147	Einstein and special relativity
				230	James Watt	156	George S. Ohm (1787-1854)
				279	Pierre and Jacques Curie and the piezoelectric effect	167	analyze electric appliance labels
				314	sound in space	223	Bernoulli
				333	Thomas Edison and the electric light	229	Rutherford, Geiger, Marsden
				336	Einstein and the speed of light		
				338	Albert Einstein		
				383	Thomas Young		
				388	Albert Einstein's theory of special relativity		
				389	Albert A. Michelson and Edward R. Morley		
				394	holograms and science fiction special effects		
				422	Gustav Robert Kirchhoff		
				462	magnetism		
				469	history of magnetism		
				521	development of atomic theory		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page	Volume Two Investigation Manual Page
	523 ancient Greeks' ideas of elements 596 Niels Bohr 597 Johann Balmer 598 transporter beams 600 Wolfgang Pauli 602 Max Planck and Albert Einstein 630 Wolfgang Pauli 644 proof of Einstein's theory of general relativity 647 Paul Dirac	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.5.7 Science	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.	224 226 228 234 236 237 266 471 524 591 600	processes natural systems and efficiency reversible and irreversible processes energy flow in systems natural systems work in cycles food webs and ecosystems harmonic motion in natural systems shifting and reversal of Earth's magnetic poles how the periodic table is organized periodic table is arranged by atomic number periodic table and quantum states	29	system of Atwood's machine
1.5.8 Science	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.	49 235	writing procedures in a lab notebook helps make sure your results are repeatable breaking down an energy flow system into processes	142	communicate your findings

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.5.9 Science	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.	49	writing procedures in a lab notebook helps make sure your results are repeatable	18	what do the results tell you?
						50	what would happen if...?
						92	explain your observations
				328	explain why hearing can be damaged by loud sounds	100	explain how force applied causes the response
						103	explain why higher tension makes waves move faster
						105	explain how wind might cause big waves in water
						124	explain how the colored filters work
						142	present your findings
						142	communicate your findings
						153	what conclusions can you draw?
						154	analyze data and explain a rule
						205	display information you found for your element

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.6.1 Science	Skills and Processes	The student will use mathematical processes.	The student will use ratio and proportion in appropriate situations to solve problems.	34	converting units using dimensional analysis	18	find the slope of the line
				65	slope of a position vs. time graph	41	calculate percent difference
				81	determining units of acceleration	42	calculate percent difference
				85	acceleration and slope of a speed vs. time graph	50	calculate percent difference
						95	calculate percent error

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.6.2 Science	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)	36	reading a digital timer	10 10 14 25 27 47 59 77 80 94 100 194	using photogate using the DataCollector using the DataCollector and velocity sensor use the DataCollector and velocity sensor use the DataCollector and velocity sensor use the DataCollector and photogates use the DataCollector and photogate use the DataCollector and photogate use the DataCollector and photogate use the DataCollector and photogate use photogate and DataCollector to measure the period use a photogate and DataCollector

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.6.3 Science	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.	40	expressing very large and very small numbers using scientific notation	8	significant digit practice
				174	description of law of universal gravitation	13	scientific notation practice
				175	formula and calculations for law of universal gravitation	60	calculate gravitational force of attraction
				176	orbital motion	60	investigate law of universal gravitation
				180	calculate weight and acceleration due to gravity on Pluto	60	using scientific notation
				238	tides are due to force of gravity	175	investigate Coulomb's law
				446	Coulomb's law		
				447	calculate force using Coulomb's law		
				460	calculating charge using Coulomb's law		
				642	Newton's laws and gravity		

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.6.4 Science	Skills and Processes	The student will use mathematical processes.	The student will manipulate quantities and/or numerical values in algebraic equations.	82	creating the acceleration formula from experiments	24	uniform acceleration model
				88	developing the formulas for a model of motion with constant acceleration	26	create an algebraic model
						50	create algebraic model
				304	write a formula relating velocity of wave to period and wavelength	58	write a formula
						107	give an equation that describes your observations
				334	light intensity follows an inverse square law	223	Bernoulli's equation

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.6.5 Science	Skills and Processes	The student will use mathematical processes.	The student will judge the reasonableness of an answer.	46	why accuracy and precision are important	18	what do the results tell you?
				51	using a graphical model to make a prediction and checking the model's accuracy	24	how do you measured positions compare to model?
						24	compare calculation with graph estimate
				319	frequency spectrum	41	calculate percent difference
				328	explain why hearing can be damaged by loud sounds	42	calculate percent difference
						50	how does the measurement compare to your prediction?
						50	calculate percent difference
						50	what would happen if...?
						92	explain your observations
						95	calculate percent error
						100	explain how force applied causes the response
						103	explain why higher tension makes waves move faster
						105	explain how wind might cause big waves in water
						124	explain how the colored filters work

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page	Volume Two Investigation Manual Page
		132 are there differences between your prediction and measurement? 153 what conclusions can you draw? 154 analyze data and explain a rule

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.7.1 Science	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.	53	use of nanotechnology	167	find power rating of appliances and estimate cost
				74	Dr. Harold Edgerton and strobe photography	243	research energy used per person
				94	antilock brakes application		
				113	biomechanics application		
				114	applications of biomechanics		
				134	impact of technology		
				134	designing a bridge		
				160	use of robots		
				177	geostationary satellites		
				218	hydroelectric power application		
				231	range of power for common devices		
				238	energy from ocean tides		
				239	research into tidal power		
				241	using energy efficient products		
				250	seat belts and air bags		
				257	jet engines application		
				279	quartz crystals application		
				315	uses of Doppler radar		
				333	invention of electric light		
				347	the printing press		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	371	the telescope	
	400	importance of electricity	
	414	environmental impact of auto pollution	
	414	hybrid cars combine advantages of gasoline fuel and electric power	
	414	hybrid gas/electric cars application	
	435	wiring application	
	473	MRI application	
	512	why computers are useful	
	556	energy-efficient building application	
	556	energy-efficient building application	
	557	designing buildings to be energy efficient	
	607	economics of laser technology	
	621	human technology contributes to radiation in environment	
	621	sources of radiation in the environment	
	623	creation of CAT scans	
	628	nuclear waste	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page	Volume Two Investigation Manual Page
	631 nuclear power application 632 nuclear waste	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.7.2 Science	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.	53	use of nanotechnology	167	find power rating of appliances and estimate cost
				94	antilock brakes application	243	research energy used per person
				134	designing a bridge		
				134	impact of technology		
				160	use of robots		
				177	geostationary satellites		
				218	hydroelectric power application		
				231	range of power for common devices		
				238	energy from ocean tides		
				239	research into tidal power		
				241	using energy efficient products		
				250	seat belts and air bags		
				257	jet engines application		
				279	quartz crystals application		
				315	uses of Doppler radar		
				333	invention of electric light		
				347	the printing press		
				371	the telescope		
				400	importance of electricity		
				414	hybrid gas/electric cars application		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	414	hybrid cars combine advantages of gasoline fuel and electric power	
	414	environmental impact of auto pollution	
	435	wiring application	
	473	MRI application	
	512	why computers are useful	
	556	energy-efficient building application	
	556	energy-efficient building application	
	621	UV radiation and thinning of ozone layer	
	621	human technology contributes to radiation in environment	
	621	sources of radiation in the environment	
	623	creation of CAT scans	
	628	nuclear waste	
	631	nuclear power application	
	632	nuclear waste	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.7.3 Science	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)	74	Dr. Harold Edgerton and strobe photography	107	investigate harmonic wave patterns
				74	Dr. Harold Edgerton and strobe photography	124	investigate RGB and CMYK models of color
				113	biomechanics application		
				114	applications of biomechanics		
				134	impact of technology		
				177	first artificial human-made Earth satellite was Sputnik		
				200	Great Pyramid of Giza and simple machines		
				279	Pierre and Jacques Curie and the piezoelectric effect		
				291	wave motion and equilibrium		
				298	concept of harmonics		
				312	technological breakthrough of sound recording		
				324	harmonics and frequency and the color of sound		
				332	past theories of light		
				340	the additive color process		
				341	the subtractive color process		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	343	the RGB and CMYK color processes are complementary	
	347	history of printing	
	347	color separations in high quality printing	
	348	the CMYK four-color printing process	
	370	the usefulness of recorded images	
	371	the telescope	
	383	Young's double-slit experiment	
	389	Einstein and theory of special relativity	
	390	Einstein's thinking revolutionized physics	
	469	discovering and using magnetism	
	523	search for elements and alchemy	
	582	deep water submarine Alvin application	
	583	the Alvin research submarine	
	597	discovery of helium	
	625	turning lead into gold	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.7.4 Science	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)	82 88 123 124 304 334 352 514	creating the acceleration formula from experiments developing the formulas for a model of motion with constant acceleration a model for friction a model for static friction write a formula relating velocity of wave to period and wavelength light intensity follows an inverse square law optics and optical instruments the binary number system and its use in computers	24 24 26 50 58 107 223	uniform acceleration model model for uniform accelerated motion create an algebraic model create algebraic model write a formula give an equation that describes your observations Bernoulli's equation
1.7.5 Science	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)	113 113 249 311 426	careers in biomechanics biomechanics application police forensic scientists careers in acoustics electrical engineers		

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
1.7.6 Science	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	nanotechnology application	191	apply steps of the design cycle to building different electric motors
				53	use of nanotechnology	197	electronic devices are part of our daily lives
				73	analyzing motion with video and strobe photography	203	designing and building logic circuits
				94	antilock brakes application		
				95	use of control computers in cars		
				134	designing a bridge		
				134	relationship between science and engineering and technology		
				135	the engineering design cycle		
				160	use of robots		
				177	geostationary satellites		
				194	bicycle physics application		
				218	hydroelectric power application		
				231	range of power for common devices		
				238	energy from ocean tides		
				239	research into tidal power		
				250	seat belts and air bags		
				257	jet engines application		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	265	oscillators are used in communications and music and clocks	
	279	quartz crystals application	
	285	waves can carry information	
	285	medical technology using waves	
	311	stethoscopes used to hear sound vibrations	
	315	uses of Doppler radar	
	318	ultrasound technology	
	333	invention of electric light	
	347	the printing press	
	358	fiber optics are used for surgical inspections	
	371	the telescope	
	391	technological advances have allowed discovery of the expanding universe	
	394	holography application	
	400	importance of electricity	
	414	hybrid gas/electric cars application	
	414	hybrid gas/electric cars application	
	435	wiring application	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	451	electron beam accelerators	
	465	magnetic resonance imaging	
	473	MRI application	
	473	MRI application	
	494	maglev train application	
	495	how magplanes levitate	
	512	why computers are useful	
	514	computers and electronic addition of numbers application	
	538	refrigerator application	
	553	infrared thermometers	
	556	energy-efficient building application	
	565	failure analysis in the design process	
	582	deep water submarine Alvin application	
	607	laser application	
	615	smoke detectors	
	622	x-ray machines	
	623	CAT scans	
	623	creation of CAT scans	
	631	nuclear power application	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page	Volume Two Investigation Manual Page

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
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.	140	vectors have magnitude and direction	44	investigating vectors
				141	adding vectors	45	using polar coordinates
				141	displacement vectors	46	calculate the resultant vector
				142	adding vectors	46	plotting position with cartesian coordinates
				142	representing vectors in Cartesian and polar coordinates	50	calculate the velocity vector
				143	adding and subtracting vectors	51	investigating force vectors
				144	calculating vector components	51	investigating force vectors
				145	finding magnitude and angle of a vector	52	calculate force components
				146	definition of the velocity vector	58	draw a free body diagram and label forces
				147	the velocity vector	58	draw a free body diagram and label forces
				147	the velocity vector	87	momentum is a vector
				147	representing the velocity vector in polar and Cartesian coordinates	92	angular momentum behaves like a vector
				148	representing the velocity vector in polar and Cartesian coordinates		
				148	components of the velocity vector		
				148	components of the velocity vector		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	149	adding velocity vectors	
	149	adding velocity vectors	
	150	independence of horizontal and vertical motion in a velocity vector	
	152	calculating velocity components of initial velocity	
	154	representing the force vector in Cartesian and polar coordinates	
	154	interpreting the x-y components of force	
	155	calculating components of a force vector	
	156	choosing coordinates for an inclined plane	
	158	calculate the acceleration of a skier on a slope	
	158	calculate the acceleration of a skier on a slope	
	163	explain vectors in Cartesian and polar coordinates	
	208	work done by a force at an angle to the distance	
	208	work done by a force at an angle to the distance	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page	Volume Two Investigation Manual Page
	244 comparison of kinetic energy and momentum 245 momentum is a vector 259 why is momentum a vector	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

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.	48	speed of a ball on a ramp	14	collect data and calculate speed of car
				58	speed is the rate of change of position	14	calculate speed of rolling marble
				61	speed is relative	25	investigate the effect of gravity
				61	the precise meaning of speed	26	derive acceleration equation
				62	calculating speed	44	investigating vectors
				62	how to calculate speed	47	analyze the motion of a marble in 2 dimensions
				64	average and instantaneous speed	47	find initial speed of car
				65	determining speed from the slope of a position vs. time graph	49	investigate the range of a projectile
				68	the speed formula and calculating speed	50	calculate the velocity vector
				68	compare and contrast speed and velocity	50	create and test a model to predict the landing spot of a projectile
				80	acceleration is the rate of change in the speed of an object	59	calculate the speed of the car
				81	comparing speed and acceleration	78	find the speed of the ball
				82	formula for acceleration	81	what is speed of the car?
				83	general definition of acceleration	103	calculate the speed of the wave pulse
				84	acceleration is total change of speed divided by total change in time	148	relativity and frames of reference

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page	
	86	calculate speed in accelerated motion	225	calculate speed of air in homemade air-speed tester
	86	calculating the speed of an object that is accelerating		
	86	calculate speed in accelerated motion		
	89	calculate time and distance from acceleration		
	90	free fall and acceleration due to gravity		
	91	motion formulas for free fall		
	92	solving problems with free fall		
	93	acceleration of gravity does not depend on mass		
	106	direction of net force and acceleration and speed		
	119	strength of gravity on Earth and Jupiter		
	120	gravity and acceleration and weightlessness		
	140	vectors have magnitude and direction		
	141	displacement vectors		
	146	definition of the velocity vector		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	146	projectiles and trajectories	
	147	speed is the magnitude of the velocity vector	
	147	the velocity vector	
	148	components of the velocity vector	
	149	adding velocity vectors	
	149	calculating velocity vectors may require knowing frames of reference	
	150	gravity only accelerates vertical motion	
	151	vertical motion of a projectile	
	152	projectiles launched at an angle	
	153	range of projectiles	
	156	resolving force of gravity in ramp coordinates	
	157	acceleration down an inclined plane	
	163	effects of gravity on motion of a projectile	
	168	calculating linear speed of a moving wheel	
	169	the linear speed of a rolling wheel	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	172	centripetal acceleration	
	174	law of universal gravitation and orbital motion	
	176	orbits and gravitational force	
	177	centripetal force and the law of universal gravitation combine to form the orbit equation	
	180	compare projectile motion to orbital motion	
	187	the motion of a tossed object	
	188	centers of mass and gravity may differ	
	209	work done against gravity	
	213	potential energy comes from gravity	
	388	special relativity and time dilation	
	389	relative motion and speed of light	
	391	frequency of light depends on relative motion	
	393	simultaneity depends on the relative motion of your frame of reference	

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page
				643	frame of reference and the equivalence principle	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

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.	38	weight is a measure of the force of gravity pulling on mass	27	collect data on Newton's first law
				38	calculating weight from mass	27	study Newton's first law
				39	understanding and measuring mass	28	were any forces acting on the car?
				48	effect of friction on motion of a ball on a ramp	28	explain how Newton's first law applies
				83	any acceleration must come from a force	29	investigate Newton's second law
				93	air resistance and terminal speed	32	investigate Newton's third law
				94	friction and traction and antilock brakes	34	draw free body diagrams and identify action-reaction pairs
				100	changes in motion only occur through force	37	investigate sliding friction
				100	force is an action that can change motion	52	balancing a specified force
				101	all objects tend to resist changes in motion	58	consider forces acting on the car
				103	force is related to acceleration	61	converting mass to weight
				103	Newton's second law of motion	71	what effect does friction have on mechanical advantage?
				104	English unit of force is the pound		
				105	calculation using Newton's second law		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	105	finding the net force	
	106	Newton's second law and dynamics problems	
	106	calculating net force	
	107	finding force from acceleration	
	107	force problems	
	107	if there is acceleration there must be force	
	108	zero acceleration means net zero force	
	109	forces always occur in action-reaction pairs	
	110	Newton's third law operates on pairs of objects	
	111	identifying which force is acting on which object	
	111	solving problems with action-reaction forces	
	114	measuring forces from a vertical jump	
	115	problems using Newton's first law and second law	
	115	explain the difference between mass and weight	
	116	force calculations in different units	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	116	seat belt problem	
	118	differences between mass and weight	
	119	calculating weight with mass and gravity	
	120	weight and acceleration	
	121	weight calculations	
	121	weight is a force but mass is not	
	121	balanced force problems	
	122	the force of friction and the different types of friction	
	122	friction is a force that resists motion	
	123	a model for friction	
	124	calculating the force of friction	
	124	the normal force as the reaction in an action-reaction pair	
	125	net force includes the force of friction	
	125	friction and motion	
	126	reducing friction force	
	127	friction applications	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	128	net force must be zero in equilibrium	
	128	Newton's second law and net force	
	129	forces on a free-body diagram	
	129	net force of zero and free-body diagram	
	130	equilibrium and Newton's second law	
	130	use equilibrium to find an unknown force	
	133	understanding reaction forces in terms of springs and deformation	
	134	analysis of forces on a bridge	
	137	explain weight and mass	
	137	friction of a pulled sled	
	138	calculate the acceleration of a toy	
	138	calculate mass from weight	
	146	effects of friction on trajectories	
	155	balancing forces in two dimensions	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	157	frictional force on an inclined plane	
	157	normal force of an inclined plane	
	158	calculating acceleration on a ramp	
	158	calculating acceleration on a ramp accounting for friction	
	159	the vector form of Newton's second law	
	159	calculating acceleration from 3-D forces	
	163	calculate the net force	
	164	effects of friction on acceleration	
	170	direction of force determines linear or rotational motion	
	170	centripetal force causes circular motion	
	171	calculating centripetal force	
	172	formula for centripetal acceleration	
	174	attractive force between mass of person and mass of object is weight	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	190	Newton's first law and rotational inertia	
	191	Newton's second law applies to rotational motion	
	193	Newton's second law for rotational motion variables	
	205	friction and mechanical advantage of wheel and axle	
	206	friction and mechanical advantage of ramps and screws	
	244	Newton's first law and momentum	
	246	momentum and Newton's third law	
	250	Newton's second law relating force and momentum	
	251	momentum form of Newton's second law	
	267	friction causes damping in oscillators	
	274	Newton's second law and natural frequency	
	276	definition of periodic force	
	278	friction and steady state	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	447	electric forces always occur in pairs according to Newton's third law	
	570	Newton's third law and pressure in a fluid	
	572	pressure and the third law	
	579	pressure of gases	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

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.	48	effect of friction on motion of a ball on a ramp	34	draw a free-body diagram
				93	air resistance and terminal speed	37	investigate sliding friction
				94	friction and traction and antilock brakes	58	draw a free-body diagram of marble when it is at the top of loop
				122	the force of friction and the different types of friction	60	calculate gravitational force of attraction
				123	a model for friction	60	investigate law of universal gravitation
				124	calculating the force of friction	71	what effect does friction have on mechanical advantage?
				125	friction and motion	83	calculate work
				126	reducing friction force	83	calculate person's power
				127	friction applications	84	calculate work done
				129	creating free-body diagrams	84	calculate power output for each climber
				130	equilibrium and free-body diagrams	87	calculating momentum
				134	free-body diagram of a bridge	87	momentum is a vector
				137	friction of a pulled sled	90	which ball had a greater change in momentum?
				146	effects of friction on trajectories	92	angular momentum behaves like a vector
				157	frictional force on an inclined plane		
				157	inclined planes and free-body diagrams		

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page
				158	calculating acceleration on a ramp accounting for friction	
				164	effects of friction on acceleration	
				174	description of law of universal gravitation	
				175	formula and calculations for law of universal gravitation	
				176	orbital motion	
				180	calculate weight and acceleration due to gravity on Pluto	
				205	friction and mechanical advantage of wheel and axle	
				206	friction and mechanical advantage of ramps and screws	
				207	how to calculate work	
				209	calculating work done against gravity	
				229	calculate power in climbing stairs	
				230	power formulas	
				232	estimating the power in wind	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	233	power in biological systems	
	238	tides are due to force of gravity	
	242	calculate power rating	
	244	comparison of kinetic energy and momentum	
	245	momentum formula and calculating momentum	
	245	momentum is a vector	
	246	law of conservation of momentum	
	247	conservation of momentum in collisions	
	248	solving elastic and inelastic collision problems	
	248	applying conservation of momentum	
	249	momentum conservation for collisions in two and three dimensions	
	251	force on a rocket from change in momentum	
	252	calculate change in momentum for elastic vs. inelastic collisions	
	252	impulse formula	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	253	conservation of angular momentum examples	
	254	conservation of angular momentum	
	257	jet engines work because of conservation of momentum	
	258	momentum conservation of turbofan engine	
	259	why is momentum a vector	
	260	difference between impact and impulse	
	260	momentum in billiards	
	261	calculate momentum	
	267	friction causes damping in oscillators	
	278	friction and steady state	
	298	natural frequency and harmonics	
	392	Einstein's thinking about momentum of particles moving near the speed of light	
	431	power and efficiency of electric cars	
	629	conservation of momentum in nuclear reactions	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page
				642	Newton's laws and gravity	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
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.	212	conversions of energy	78	law of conservation of energy
				213	the formula for potential energy	81	calculate potential and kinetic energy
				214	the formula for kinetic energy	81	find the total energy at each position
				215	deriving the formula for kinetic energy	86	draw an energy flow diagram
				216	the law of conservation of energy	88	investigating collisions and conservation of energy
				216	conservation of energy explained	90	which ball had a greater change in momentum?
				216	energy transformations		
				217	applying conservation of energy for a marble rolling on a hilly track		
				217	conservation of energy in a closed system		
				218	energy transformation hydroelectric plant		
				219	conservation of energy for Hoover Dam		
				224	efficiency and energy conversions		
				225	efficiency and conservation of energy		
				227	efficiency in biological systems		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	228	connection between efficiency and time	
	234	energy conversion	
	235	the conversion process of energy flow	
	237	energy flows in biological systems	
	241	energy flow of a model solar car	
	246	law of conservation of momentum	
	247	conservation of momentum in collisions	
	248	applying conservation of momentum	
	249	momentum conservation for collisions in two and three dimensions	
	249	kinetic energy conservation for elastic collisions	
	253	conservation of angular momentum examples	
	254	conservation of angular momentum	
	257	jet engines work because of conservation of momentum	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	275	harmonic motion involves both potential and kinetic energy	
	278	resonant systems accumulate energy	
	299	waves propagate by exchanging energy between two forms	
	342	photosynthesis converts light energy to chemical energy	
	346	light from chemical reactions	
	378	electromagnetic waves exchange energy between electricity and magnetic parts	
	392	relationship and conservation of mass and energy	
	392	Einstein's thinking about momentum of particles moving near the speed of light	
	415	conversion of energy in regenerative braking	
	422	energy conversions in a series circuit	
	473	MRI--energy exchange by a nucleus in a magnetic field	

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	486	electric motor uses electromagnets to convert electrical energy to mechanical energy	
	489	electric generators transform mechanical energy into electric energy	
	491	energy conservation and Faraday's law	
	537	thermodynamics and conservation of energy	
	574	conservation of energy in fluids	
	575	energy conservation and Bernoulli's equation	
	629	conservation of momentum in nuclear reactions	
	629	conservation of energy in nuclear reactions	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

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.	440 electric charge is a fundamental property of matter 441 electric forces are created between electric charges 442 explanation of coulomb 443 current is the flow of charge 444 negative charge of electrons and current flow 445 static electricity and charge polarization and induction 446 Coulomb's law 446 relationship of electric force and charge 447 the force between charges 447 calculate force using Coulomb's law 448 charge creates an electric field 448 fields and forces 449 an electric field exists around a charge 450 source charges and test charges 452 capacitor is a storage device for electric charge	170 investigate a triboelectric series 171 create an electrophorus 171 investigate triboelectric charging 175 investigate Coulomb's law 176 investigate how capacitors work 178 what is the difference between a capacitor and a battery? 181 how are magnetic field lines similar to electric field lines?

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	452	a capacitor stores charge	
	453	simple capacitor circuit	
	454	how a capacitor works and making a simple capacitor	
	455	ability of a capacitor to store charge is capacitance	
	455	calculating capacitance	
	460	calculating charge using Coulomb's law	
	460	calculating capacitance	
	463	comparing magnetic and electric forces	
	464	force between two magnetics is not an inverse square law	
	465	magnets create a magnetic field around them	
	649	every field has an associated particle	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

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.	378	electricity and magnetism oscillations	150	construct simple electric circuits
				400	concept of electric current	150	short circuit precautions
				401	concept of a circuit	152	construct a simple circuit
				402	understanding simple circuit and its diagram	152	short circuit precautions
				402	circuit diagrams and electrical symbols	152	explore the concept of electric current
				403	definition of short circuit	156	Ohm's law
				403	open and closed circuits	157	derive Ohm's law from experiment
				404	current flows through wires and carries energy	158	use Ohm's law to calculate the resistance
				406	battery uses chemical energy to produce electrical charge	160	investigate series circuits
				408	simple bulb and battery circuits to illustrate electrical resistance	161	apply Ohm's law to series circuits
				408	relationship between current and resistance	162	compare series and parallel circuits
				410	Ohm's law	164	build and analyze network circuits
				410	calculate the current flowing in a circuit	176	short circuit precautions
				412	classifying materials as conductor or insulator or semiconductor	179	investigate magnetic forces
				417	classify conductivity of materials	181	draw magnetic field lines for a bar magnet
						181	how are magnetic field lines similar to electric field lines?

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page	
	418	calculation of voltage from resistance and current	182	test materials to see if they are affected by magnets
	420	series circuit defined	187	study the right-hand rule
	421	calculating current in a series circuit using Ohm's law	188	experiment with pushes and pulls of permanent magnet in a rotor
	421	current and resistance in a series circuit	193	investigate electromagnetic induction
	422	Kirchoff's voltage law	194	build a generator
	422	voltage in a series circuit	200	use Ohm’s law to calculate the resistance of the transistor
	423	Kirchhoff's current law		
	424	advantages of parallel circuits over series circuits		
	424	short circuits		
	425	using Ohm's law in parallel circuits		
	426	using Ohm's law for circuit analysis		
	426	using Kirchhoff's voltage law for circuit analysis		
	426	using Kirchhoff's current law for circuit analysis		
	427	voltage dividers		
	427	analyzing a voltage divider circuit		
	428	comparing series and parallel circuits		

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	429	calculate currents and voltages in a network circuit	
	429	solving network circuits	
	430	current definition	
	433	definition of AC current	
	433	definition of DC current	
	434	calculating power for AC circuits using a power factor	
	436	why series circuits are not used in homes and buildings	
	437	explain short circuit	
	437	compare current in a series and parallel circuit	
	438	using Ohm's law to calculate current	
	443	current is the flow of charge	
	444	negative charge of electrons and current flow	
	448	fields and forces	
	449	an electric field exists around a charge	
	453	circuit symbol for a capacitor	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	453	current into and out of capacitors	
	462	magnets and magnetic materials	
	462	magnetism explained	
	463	effect of magnetic force on magnetic and nonmagnetic materials	
	463	comparing magnetic and electric forces	
	464	force between two magnetics is not an inverse square law	
	465	understanding magnetic fields	
	465	magnets create a magnetic field around them	
	466	magnetic properties of materials	
	467	alignment of domains responds to magnetic fields	
	467	ferromagnetism	
	468	creating permanent magnets	
	468	properties of ferromagnetic materials	
	469	the magnetic field of Earth	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	470	a compass is a magnet that lines up with Earth's magnetic field	
	471	Earth's magnetic core	
	471	the strength of Earth's magnetic field	
	473	magnetic field of a nucleus	
	475	comparing different magnetic materials	
	476	magnetic field between two unlike poles	
	479	right-hand rule	
	480	the magnetic field of loops and coils	
	481	why only some materials are magnetic	
	481	the magnetic field of coils and permanent magnets	
	482	magnetic force on a moving charge	
	483	calculating magnetic fields and forces	
	484	finding the poles of an electromagnet using right-hand rule	
	488	AC motors	
	489	concept of electromagnetic induction	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	492	generating electricity by induction	
	492	generators are source of alternating current	
	493	transformers operate on electromagnetic induction	
	493	transformers only work with AC current	
	497	using right-hand rule	
	500	diodes and AC to DC adapters	
	500	diodes and AC to DC adapters	
	506	rectifier circuit converts AC electricity to DC	
	506	rectifier circuit converts AC electricity to DC	
	649	every field has an associated particle	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
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.	434	average power in an electric motor	188	investigate how an electric motor works
				486	principle of the electric motor	193	investigate electromagnetic induction
				487	commutation	194	build a generator
				488	battery-powered electric motors		
				489	concept of electromagnetic induction		
				492	generating electricity by induction		
				493	transformers operate on electromagnetic induction		

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

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.	217 frictional energy converted to heat 225 friction converts input work to heat 528 temperature measures average kinetic energy 529 absolute zero and the limits of temperature 531 melting 531 temperature change and thermal energy 532 boiling 533 evaporation and condensation 534 temperature and thermal energy and heat 535 balance of thermal energy 535 transfer of thermal energy 536 specific heat and the heat equation 538 refrigerator application 542 relationship between temp and average kinetic energy 544 thermal equilibrium 544 heat conduction	209 use specific heat to identify an unknown metal sample 212 investigate conduction 215 investigate convection in a liquid 216 observing forced convection 217 investigate radiant heat 218 observing radiant energy in action

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	545	thermal conductors and insulators	
	545	heat conduction	
	546	conduction in solids and liquids and gases	
	548	convection in liquids	
	549	convection depends on speed and surface area	
	550	convection and weather	
	552	radiation	
	557	sources of heat transfer in buildings	
	557	sources of heat transfer in buildings	
	559	heat flow between objects of different temperature	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

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.	284	waves transmit energy	102	study characteristics of a wave pulse on a string
				285	waves are a form of traveling energy	102	making wave pulses on a string
				286	basic properties of frequency and wavelength and amplitude	102	study wave pulses on elastic cord
				287	speed of a wave vs. speed of its medium	103	measure speed of a wave pulse
				287	wave pulse	104	is your water wave transverse or longitudinal?
				289	water waves are transverse and Slinky is longitudinal	104	making circular waves in a ripple tank
				289	transverse and longitudinal waves	104	make different types of waves in a ripple tank
				290	one- and two- and three-dimensional waves	104	making plane waves in a ripple tank
				290	creating plane waves and circular waves	106	investigate frequency and wavelength
				291	propogation of waves through continuous materials	108	waves carry energy from one place to another
				294	waves transfer energy through absorption	145	study the polarization of a transverse spring wave
				297	standing waves on a string		
				299	energy of a wave		
				299	standing waves on a string		
				300	modes of a wave		
				301	modes of vibration		

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	305	type of wave represented by a spring	
	306	which direction does a cork move on a water wave?	
	308	sound waves require matter to traverse	
	308	properties of sound waves	
	314	sound is a longitudinal wave	
	316	speed of sound in different materials	
	325	design of a guitar	
	330	wave amplitude and harmonics of tuning fork and musical instrument	
	552	electromagnetic radiation	
	552	energy and radiation relationships	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

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.	264 what is a cycle? 266 concepts of period and frequency explained 267 concept of amplitude explained 271 analyze the motion of the cycle of a pendulum 273 systems tends to have a preferred frequency 280 identify period and frequency and cycle and amplitude 282 calculate speed of an oscillator 286 frequency and amplitude and wavelength in waves 287 concept of speed of a wave 288 speed of a wave is the speed at which a cycle moves 288 formula for speed of a wave 299 energy of a wave is proportional to frequency and amplitude 300 wavelength of a standing wave	93 investigate the motion of a pendulum 101 if frequency is increased what happens to total energy? 103 study the speed of the wave pulse 107 investigate the wavelength of standing waves 107 investigate the frequency of standing waves 144 use a spectrometer to measure wavelength of different colors of light

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	304	describe relationship between wave characteristics	
	309	frequency and pitch of sound	
	310	relationship of loudness and amplitude and pressure in sound wave	
	313	pressure and amplitude of sound waves	
	314	importance of wavelength of sound waves	
	314	frequency and wavelengths of sound	
	322	pitch and frequency in music	
	379	relationship between frequency and energy and color of light	
	397	relate color to frequency for visible light	
	474	MRI--each nucleus is a resonant oscillator	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

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.	276	concept of resonance	99	investigate resonance and its importance
				277	resonance occurs when periodic force matches natural frequency	105	observing reflection in water waves
				281	resonance and amplitude	105	investigate diffraction in a ripple tank
				292	waves and diffraction	105	investigate reflection in a ripple tank
				292	waves and refraction	108	natural frequency and resonance of standing waves on a string
				292	waves and reflection	131	study how refraction works
				292	waves and absorption	131	study how refraction works
				293	waves and reflection and boundaries	131	investigate Snell's law of refraction
				293	waves and refraction and boundaries	132	apply Snell's law of refraction
				294	waves and diffraction and boundaries	132	study the critical angle of refraction in a prism
				294	waves and absorption and boundaries	132	study index of refraction
				295	sound and light waves and interference	143	study light diffraction patterns
				296	resonance and reflection	143	study light interference
				296	how resonance is created	145	polarization of water waves
				297	standing waves and natural frequency and resonance	145	polarization of a spring wave
				308	sound is a wave of pressure		
				311	vibrations create sound		

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
				313	how we know sound is a wave	146	study the polarization of light
				315	definition of the Doppler effect	146	polarization of light
				316	Doppler effect and supersonic and subsonic motion		
				316	effect of medium and temperature on speed of sound wave		
				317	resonance of sound		
				328	list evidence that sound is a wave		
				329	understanding of Doppler effect		
				337	light rays bounce off a surface		
				337	mirrors		
				337	light bends as it moves into a material		
				337	light bends as it moves into a material		
				346	the process of how light is reflected		
				353	lenses bend light		
				353	mirrors reflect light		
				354	specular and diffuse reflection		

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	354	the image in a mirror	
	355	finding the normal line for reflection	
	356	the index of refraction	
	356	refraction is the bending of light rays	
	356	refraction is the bending of light rays	
	357	refraction depends on index of refraction in both materials	
	357	Snell's law of refraction	
	358	total internal reflection and the critical angle	
	361	the image formed in a mirror	
	362	design of a lens	
	362	design of a lens	
	362	lenses follow Snell's law of refraction	
	367	diffraction spot size image defect	
	375	explain index of refraction	
	376	using Snell's law	
	378	electromagnetic waves are oscillations of an energy field	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Goal Expectation Indicator Subject	Volume One Student Text Page		Volume Two Investigation Manual Page
	380	index of refraction is ratio of speed of light in material to speed of light in vacuum	
	383	interference of light waves and Young's double-slit experiment	
	384	diffraction grating	
	385	polarization	
	386	transmission of light through two polarizers	
	386	polarizers	
	387	applications of polarization	
	395	holograms and the interference of light	
	552	absorption of thermal radiation	
	552	absorption of thermal radiation	
	553	blackbody and perfect absorption of light	
	596	absorption of light	
	608	emission and absorption of photons in laser light	
	638	Doppler effect and red shift	

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page	
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.	336	Einstein's theory of relativity	147	when does special relativity become important?
				388	relationship between matter and energy and time and space	148	the equivalence of mass and energy
				389	speed of light paradox		
				390	speed and time and clocks		
				391	consequences of time dilation		
				392	Einstein's mass-energy formula		
				393	simultaneity depends on the relative motion of your frame of reference		
				616	energy and radioactivity		
				625	nuclear reactions can convert mass into energy		
				629	energy is stored as mass in nuclear reactions		
				642	Einstein's theory and gravity and inertial mass		
				644	general relativity and curved space-time		
				645	black holes and general relativity		
				647	energy released in reactions between matter and antimatter		

Correlation to Maryland Core Learning Goals: Physics

CPO Science Foundations of Physics, 2nd Ed.

Student Text and Investigation Manual

Standard #: Subject	Goal	Expectation	Indicator	Volume One Student Text Page		Volume Two Investigation Manual Page
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.	524	elements past #92 are radioactive and decay	
				592	use of radioactive isotopes in medicine	
				592	radioactive isotopes	
				595	fusion	
				595	nuclear reactions	
				614	radioactive decay	
				616	energy and radioactivity	
				622	x-ray machines	
				623	CAT scans	
				625	nuclear reactions	
				627	fusion reactions	
				628	fission reactions	
				632	nuclear energy	
				635	differences between fission and fusion	