

Correlation to Missouri Science Expectations, Grade 9 - 11

CPO Science - Physics: A First Course

Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page		
1.2.A.a Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Forms of energy have a source, a means of transfer (work and heat) and a receiver	Differentiate between thermal energy, heat, and temperature	170	converting between Fahrenheit and Celsius	30	measure final temperature
				170	measuring temperature	30	investigate difference between temperature and heat
				175	Kelvin and Celsius scales	31	measure final temperature
				176	flow of thermal energy is heat	32	investigate concept of specific heat
				176	understanding the difference between heat and temperature	33	measure final temperature
				177	heat and work	48	measure temperature
				178	specific heat explained	49	measure temperature
				181	thermal equilibrium	50	measure temperature
				185	heat transfer is everywhere		
				242	generation of heat from frictional motion		
1.2.A.b Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Forms of energy have a source, a means of transfer (work and heat) and a receiver	Recognize chemical energy as the energy stored in the bonds between atoms in compounds	265	exothermic and endothermic reactions	48	investigate energy changes in chemical reactions
						48	investigate chemical reactions and energy
						50	investigate and identify exothermic and endothermic reactions

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1.2.A.c Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Forms of energy have a source, a means of transfer (work and heat) and a receiver	Describe the relationship among wavelength, energy, and frequency as illustrated by the electromagnetic spectrum	483 color and light 523 electromagnetic spectrum 524 wavelength and frequency of visible light 524 energy and color of light 526 low-energy electromagnetic waves 527 high-energy electromagnetic waves 536 the electromagnetic spectrum 537 infrared telescopes	111 mixing primary colors of light 123 investigate visible light wavelengths 123 measure wavelengths of visible light using a spectrometer 123 how colors of light relate to frequency and wavelength
1.2.A.d Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Forms of energy have a source, a means of transfer (work and heat) and a receiver	Differentiate between the properties and examples of conductors and insulators of different forms of energy	176 flow of thermal energy is heat 177 heat and work 181 thermal equilibrium 182 thermal conductivity 185 heat transfer is everywhere	58 investigate conductors and insulators
1.2.A.e Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Forms of energy have a source, a means of transfer (work and heat) and a receiver	Describe sources and common uses of different forms of energy	9 basic forms of energy 240 energy and systems 241 energy exists in many different forms 243 energy flow diagrams 251 energy flow in natural systems	45 describe energy changes 46 investigate energy flow in a system 47 identify forms of energy in an experimental system 57 draw energy flow diagram of the circuit

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1.2.A.f Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Forms of energy have a source, a means of transfer (work and heat) and a receiver	Identify and evaluate advantages/disadvantages of using various sources of energy for human activity	247	burning gasoline and low efficiency	157 compare economic and environmental impact of using different energy sources 157 research electricity generation methods
				247	sources of electrical power in the United States	
				254	generating electricity from the ocean's energy	
				255	impact of generating electricity on the environment	
				255	energy in the ocean	
1.2.A.g Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Forms of energy have a source, a means of transfer (work and heat) and a receiver	Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms	335	using hybrid cars	111 mixing primary colors of light 123 investigate visible light wavelengths
				523	electromagnetic spectrum	
				524	wavelength and frequency of visible light	
				526	low-energy electromagnetic waves	
				526	low-energy electromagnetic waves	
				527	high-energy electromagnetic waves	
				527	high-energy electromagnetic waves	
				536	the electromagnetic spectrum	
537	infrared telescopes					
537	infrared telescopes					

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1.2.A.h Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Forms of energy have a source, a means of transfer (work and heat) and a receiver	Interpret examples of heat transfer as convection, conduction, or radiation	181	heat conduction	30	investigating heat transfer
				182	thermal conductivity		
				183	natural and forced convection		
				184	thermal radiation		
1.2.B.a Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Mechanical energy comes from the motion and/or position of an object	Relate kinetic energy to an object's mass and its velocity	67	calculating potential energy	15	calculate potential energy of car
				68	potential to kinetic energy conversions	24	calculate kinetic energy of sled
				68	calculating kinetic energy	47	calculate energy
				69	kinetic energy and stopping distance of a car		
				70	potential to kinetic energy conversions		
				117	potential and kinetic energy in a spring		
				249	mechanical systems and energy		

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Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page		
1.2.B.b Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Mechanical energy comes from the motion and/or position of an object	Relate an object's gravitational potential energy to its weight and height relative to the surface of the earth	67	calculating potential energy	15	calculate potential energy of car
				68	potential to kinetic energy conversions	24	calculate kinetic energy of sled
				68	calculating kinetic energy	47	calculate energy
				69	kinetic energy and stopping distance of a car		
				70	potential to kinetic energy conversions		
				117	potential and kinetic energy in a spring		
				249	mechanical systems and energy		

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Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page		
1.2.B.c Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Mechanical energy comes from the motion and/or position of an object	Distinguish between examples of kinetic and potential energy with a system	67	potential energy explained	14	investigate exchange of energy in car and track system
				68	potential to kinetic energy conversions		
				68	kinetic energy explained	15	apply law of energy conservation
				70	potential to kinetic energy conversions		
				70	law of conservation of energy		
				71	using energy conservation to solve problems		
				117	potential and kinetic energy in a spring		
				249	mechanical systems and energy		
249	energy flow diagram for mechanical systems						

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Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page		
1.2.B.d Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Mechanical energy comes from the motion and/or position of an object	Describe the effect of work on an object's kinetic and potential energy	66	energy is stored work	15	calculate potential energy of car
				67	calculating potential energy	19	investigate concept of energy as stored work
				68	calculating kinetic energy	24	calculate kinetic energy of sled
				68	potential to kinetic energy conversions	47	calculate energy
				69	kinetic energy and stopping distance of a car		
				70	potential to kinetic energy conversions		
				86	calculating work		
				88	calculating work		
				117	potential and kinetic energy in a spring		
249	mechanical systems and energy						
1.2.E.a Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Nuclear energy is a major source of energy throughout the universe	Describe how changes in the nucleus of an atom during a nuclear reaction result in the emission of radiation	221	weak force explained		
				222	radioactive decay		
				267	nuclear reactions explained		
				268	nuclear reactions and energy		
				269	fusion reactions		
				270	fission reactions		
270	radioactive materials						

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Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
1.2.E.b Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Nuclear energy is a major source of energy throughout the universe	Identify the role of nuclear energy as it serves as a source of energy for the Earth, stars, and human activity	269 fusion reactions 270 fission reactions	
1.2.F.a Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Energy can change from one form to another within and between systems but the total amount remains the same	Describe the transformations that occur as energy changes from kinetic to potential within a system	67 potential energy explained 68 potential to kinetic energy conversions 68 kinetic energy explained 70 potential to kinetic energy conversions 70 law of conservation of energy 71 using energy conservation to solve problems 117 potential and kinetic energy in a spring 249 mechanical systems and energy 249 energy flow diagram for mechanical systems	14 investigate exchange of energy in car and track system 15 apply law of energy conservation

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Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
1.2.F.b Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Energy can change from one form to another within and between systems but the total amount remains the same	Compare the efficiency of simple machines	102 efficiency explained 246 efficiency explained 247 efficiency of a heat engine 248 efficiency of living things 334 efficiency of electric motors 334 efficiency of gasoline engine	45 calculate efficiency of the experimental system 45 graph efficiency vs. speed 45 investigate efficiency
1.2.F.c Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Energy can change from one form to another within and between systems but the total amount remains the same	Classify the different forms of energy that can be observed as energy is transferred and transformed with a system when given a scenario	9 basic forms of energy 240 energy and systems 241 energy exists in many different forms 243 energy flow diagrams 251 energy flow in natural systems	45 describe energy changes 46 investigate energy flow in a system 47 identify forms of energy in an experimental system 57 draw energy flow diagram of the circuit
1.2.F.d Properties and Principles of Matter and Energy	Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems	Energy can change from one form to another within and between systems but the total amount remains the same	Explain how energy can be transferred or transformed between and within systems as the total amount of energy remains constant	10 conservation of energy	42 model how atoms exchange energy 47 draw an energy flow diagram

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Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
2.1.A.a Properties and Principles of Force and Motion	The motion of an object is described by its change in position relative to another object or point	The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference)	Represent and analyze the motion of an object graphically	46 position vs. time graphs 47 position vs. time graph for accelerating motion 48 speed vs. time graph 49 speed vs. time graph for accelerating motion 51 finding distance from a speed vs. time graph	4 position vs. time graph 11 speed vs. time graph
2.1.A.b Properties and Principles of Force and Motion	The motion of an object is described by its change in position relative to another object or point	The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference)	Analyze the speed of two objects in terms of distance and time	17 speed of light 17 speed defined 18 calculating speed 19 velocity defined 40 velocity defined 45 skydiving and terminal speed 45 terminal speed 136 speed vs. velocity 143 angular speed	6 how can speed be measured?

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Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
2.1.A.c Properties and Principles of Force and Motion	The motion of an object is described by its change in position relative to another object or point	The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference)	Calculate the speed of objects	18 56 speed units calculate speed from distance/time graph	3 find the speed of the car 7 measure the speed 9 why did the speed change? 10 find speed of car 21 measure speed of car 25 calculate speed of car 44 experiment and find average speed 46 measure speed of car

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Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page		
2.1.B.a Properties and Principles of Force and Motion	The motion of an object is described by its change in position relative to another object or point	An object that is accelerating is speeding up, slowing down, or changing direction	Measure and analyze an object's motion in terms of speed, velocity and acceleration	17	speed of light	3	find the speed of the car
				17	speed defined	4	position vs. time graph
				17	constant speed	6	how can speed be measured?
				18	calculating speed	7	measure the speed
				18	speed units	9	why did the speed change?
				32	acceleration defined	10	find speed of car
				32	acceleration of sports cars	11	compare and contrast speed and acceleration
				33	acceleration and velocity	11	find acceleration of car
				33	calculating acceleration	11	investigating net force and acceleration
				35	changes in speed or direction always involve acceleration	21	measure speed of car
				36	zero acceleration explained	25	calculate speed of car
				40	acceleration of falling objects	25	calculate acceleration of car
				45	skydiving and terminal speed	28	calculate acceleration
				45	terminal speed	28	investigate acceleration on a ramp
				46	position vs. time graphs	44	experiment and find average speed
				47	position vs. time graph for accelerating motion	46	measure speed of car
				56	calculate speed from distance/time graph		
143	angular speed						

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				149	acceleration and circular motion		
2.1.B.b Properties and Principles of Force and Motion	The motion of an object is described by its change in position relative to another object or point	An object that is accelerating is speeding up, slowing down, or changing direction	Calculate the acceleration of an object	32 33 40 149	acceleration of sports cars calculating acceleration acceleration of falling objects acceleration and circular motion	11 11 25 28 28	compare and contrast speed and acceleration find acceleration of car calculate acceleration of car calculate acceleration investigate acceleration on a ramp
2.1.C.a Properties and Principles of Force and Motion	The motion of an object is described by its change in position relative to another object or point	Momentum depends on the mass of the object and the velocity with which it is traveling	Compare the momentum of two objects in terms of mass and velocity	63 64 74 77	law of conservation of momentum using momentum conservation to solve problems momentum and collisions momentum and car safety	13	apply the law of conservation of momentum
2.1.C.b Properties and Principles of Force and Motion	The motion of an object is described by its change in position relative to another object or point	Momentum depends on the mass of the object and the velocity with which it is traveling	Explain that the total momentum remains constant within a system	63 64 74 77	law of conservation of momentum using momentum conservation to solve problems momentum and collisions momentum and car safety	13	apply the law of conservation of momentum

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2.2.A.a Properties and Principles of Force and Motion	Forces affect motion	Forces are classified as either contact forces (pushes, pulls, friction, buoyancy) or non-contact forces (gravity, magnetism) that can be described in terms of direction and magnitude	Identify and describe the forces acting on an object	28 force defined 29 Newton's first law 30 units of force 36 balanced and unbalanced forces	8 investigate Newton's first law of motion
2.2.B.a Properties and Principles of Force and Motion	Forces affect motion	Every object exerts a gravitational force on every other object	Describe gravity as an attractive force among all objects	39 calculations pertaining to free fall 39 effect of gravity on motion 52 acceleration shown through strobe photography 88 work and gravity 137 projectile explained 138 free fall component of a trajectory 153 Newton's law of universal gravitation explained 402 gravitational field	26 investigate projectile motion

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2.2.B.b Properties and Principles of Force and Motion	Forces affect motion	Every object exerts a gravitational force on every other object	Compare and describe the gravitational forces between two objects in terms of their masses and the distances between them	153 Newton's law of universal gravitation explained	
2.2.B.c Properties and Principles of Force and Motion	Forces affect motion	Every object exerts a gravitational force on every other object	Describe weight in terms of the force of a planet's or moon's gravity acting on a given mass	29 mass and inertia 43 calculating weight from mass 43 weight vs. mass 44 weight vs. mass	9 research and define inertia and weight and mass
2.2.B.d Properties and Principles of Force and Motion	Forces affect motion	Every object exerts a gravitational force on every other object	Recognize that free-falling bodies accelerate at a constant rate (neglecting friction) due to gravity	39 calculations pertaining to free fall 39 effect of gravity on motion 52 acceleration shown through strobe photography 88 work and gravity 137 projectile explained 138 free fall component of a trajectory 154 understanding orbital motion 402 gravitational field	26 investigate projectile motion

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2.2.C.a Properties and Principles of Force and Motion	Forces affect motion	Magnetic forces are related to electrical forces as different aspects of a single electromagnetic force	Recognize that changing magnetic fields can produce electrical current and electric currents can produce magnetic forces	364	electromagnets	80 compare magnetic force and electric current in an electromagnet 80 explore properties of electromagnets 81 find relationship between current and magnetic field 85 investigate electromagnetic induction
				365	building an electromagnet	
				387	electromagnetic induction explained	
2.2.C.b Properties and Principles of Force and Motion	Forces affect motion	Magnetic forces are related to electrical forces as different aspects of a single electromagnetic force	Predict the effects of an electromagnetic force on the motion of objects (attract or repel)	360	what is a magnet	77 investigate the strength of magnetic force 79 investigate interactions of different materials with magnets 81 compare electromagnet and permanent magnet 88 investigate magnetic fields 90 use magnetic fields to solve a puzzle
				362	magnetic fields	
				363	magnetic field lines	
				374	magnets and MRI scanners	
				381	magnetic field of a wire	
2.2.D.a Properties and Principles of Force and Motion	Forces affect motion	The interaction of mass and forces can be explained by Newton's Laws of Motion that are used to predict changes in motion	Recognize that inertia is a property of matter that can be described as an object's tendency to resist a change in motion and is dependent upon the object's mass	29	Newton's first law	8 investigate Newton's first law of motion 8 investigate mass and inertia
				29	inertia defined	
				148	inertia and circular motion	
				150	inertia and centrifugal force	
				424	inertia and pendulums	

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2.2.D.b Properties and Principles of Force and Motion	Forces affect motion	The interaction of mass and forces can be explained by Newton's Laws of Motion that are used to predict changes in motion	Describe the effect of a change in mass of an object on the inertia of that object (Newton's First Law of Motion)	29	Newton's first law	8 investigate Newton's first law of motion 8 investigate mass and inertia
				29	inertia defined	
				148	inertia and circular motion	
				150	inertia and centrifugal force	
				424	inertia and pendulums	
2.2.D.c Properties and Principles of Force and Motion	Forces affect motion	The interaction of mass and forces can be explained by Newton's Laws of Motion that are used to predict changes in motion	Using information about the mass and acceleration of two objects, compare the forces required to move them	35	quantitative understanding of second law	10 investigate Newton's second law of motion 23 Newton's second law of motion 25 apply Newton's second law of motion 29 apply Newton's second law of motion 95 Newton's 2nd law of motion and natural frequency
				35	Newton's second law	
				36	applying Newton's second law properly	
				37	using second law formula	
				424	Newton's second law and oscillators	

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2.2.D.d Properties and Principles of Force and Motion	Forces affect motion	The interaction of mass and forces can be explained by Newton's Laws of Motion that are used to predict changes in motion	Identify forces acting on a falling object and the factors that affect the rate of fall (i.e., mass, volume, shape, or type of material from which the object is made)	39	calculations pertaining to free fall	26 investigate projectile motion
				39	effect of gravity on motion	
				52	acceleration shown through strobe photography	
				88	work and gravity	
				137	projectile explained	
				138	free fall component of a trajectory	
				402	gravitational field	
2.2.D.e Properties and Principles of Force and Motion	Forces affect motion	The interaction of mass and forces can be explained by Newton's Laws of Motion that are used to predict changes in motion	Determine the overall effect (i.e., direction and magnitude) of forces acting on an object at the same time (i.e., net force)	31	net force explained	11 investigate net force 22 when net force is zero
				37	net force and second law calculating	
				116	when net force is zero	
2.2.D.f Properties and Principles of Force and Motion	Forces affect motion	The interaction of mass and forces can be explained by Newton's Laws of Motion that are used to predict changes in motion	Predict and explain the effect of a change in force and/or mass on the motion of an object (Newton's Second Law of Motion)	35	quantitative understanding of second law	10 investigate Newton's second law of motion 23 Newton's second law of motion 25 apply Newton's second law of motion 29 apply Newton's second law of motion 95 Newton's 2nd law of motion and natural frequency
				35	Newton's second law	
				36	applying Newton's second law properly	
				37	using second law formula	
				424	Newton's second law and oscillators	

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2.2.D.g Properties and Principles of Force and Motion	Forces affect motion	The interaction of mass and forces can be explained by Newton's Laws of Motion that are used to predict changes in motion	Analyze action/reaction forces acting between two objects (e.g., handball hits concrete wall, shotgun firing) and describe their magnitude and direction	52	action-reaction pairs	12 investigate Newton's 3rd law of motion 13 relate Newton's 3rd law of motion to car collisions
				59	Newton's third law	
				60	sorting out force pairs	
				78	third law and rockets	
				117	Newton's third law and springs	
				128	the third law and physics of walls	
				158	Newton's third law and helicopters	
2.2.D.h Properties and Principles of Force and Motion	Forces affect motion	The interaction of mass and forces can be explained by Newton's Laws of Motion that are used to predict changes in motion	Predict the change in motion of one object when it is acted upon by the equal and opposite force of another object (i.e., action/reaction forces)	52	action-reaction pairs	12 investigate Newton's 3rd law of motion 13 relate Newton's 3rd law of motion to car collisions
				59	Newton's third law	
				60	sorting out force pairs	
				78	third law and rockets	
				117	Newton's third law and springs	
				128	the third law and physics of walls	
				158	Newton's third law and helicopters	

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2.2.E.a Properties and Principles of Force and Motion	Forces affect motion	Perpendicular forces act independently of each other	Describe the force(s) that keep an object traveling in a circular path	142	angular speed vs. linear speed
				143	calculating angular speed
				143	rotations and degrees
				147	centripetal force
				148	centripetal force
				154	understanding orbital motion
2.2.E.b Properties and Principles of Force and Motion	Forces affect motion	Perpendicular forces act independently of each other	Describe the force(s) acting on a projectile on the Earth	39	calculations pertaining to free fall
				39	effect of gravity on motion
				52	acceleration shown through strobe photography
				88	work and gravity
				137	projectile explained
				138	free fall component of a trajectory
				402	gravitational field
2.2.E.c Properties and Principles of Force and Motion	Forces affect motion	Perpendicular forces act independently of each other	Predict the path of an object when the forces directing it in a given direction change	28	force defined
				36	balanced and unbalanced forces
				111	force vectors
				113	using a free-body diagram
				115	finding resultant vector

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2.2.F.a Properties and Principles of Force and Motion	Forces affect motion	Simple machines affect the forces applied to an object and/or direction of movement as work is done	Describe the relationships between work, applied net force and the distance an object moves	66	calculating work done on objects	18	compare and contrast input and output work
				66	work defined	18	calculate work
				87	work results from force and distance that are in same distance	18	investigate concept of work
				88	work done by or against gravity	20	graph force vs. distance
				94	work and simple machines	154	identify force and distance trade-off
				101	output work is always less than input work		
2.2.F.b Properties and Principles of Force and Motion	Forces affect motion	Simple machines affect the forces applied to an object and/or direction of movement as work is done	Explain how the efficiency of machines can be expressed as a ratio of work output to work input	102	efficiency explained	45	calculate efficiency of the experimental system
				246	efficiency explained	45	graph efficiency vs. speed
				247	efficiency of a heat engine	45	investigate efficiency
				248	efficiency of living things		
				334	efficiency of electric motors		
				334	efficiency of gasoline engine		

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2.2.F.c Properties and Principles of Force and Motion	Forces affect motion	Simple machines affect the forces applied to an object and/or direction of movement as work is done	Describe power in terms of work and time	89 calculating power 90 maximum power output of a person 244 power explained 245 three ways to look at power 250 power in human technology 252 power in natural systems 254 wave power 254 tidal power	

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2.2.F.d Properties and Principles of Force and Motion	Forces affect motion	Simple machines affect the forces applied to an object and/or direction of movement as work is done	Analyze and describe the relationship among work, power, and efficiency	66	calculating work done on objects	18	calculate work
				66	work defined	18	investigate concept of work
				86	calculating work	20	graph force vs. distance
				87	work results from force and distance that are in same distance	45	calculate efficiency of the experimental system
				88	calculating work	45	graph efficiency vs. speed
				88	work done by or against gravity	45	investigate efficiency
				89	calculating power	154	identify force and distance trade-off
				90	maximum power output of a person		
				102	efficiency explained		
				244	power explained		
				245	three ways to look at power		
				246	efficiency explained		
				247	efficiency of a heat engine		
				248	efficiency of living things		
				250	power in human technology		
				252	power in natural systems		
				254	wave power		
254	tidal power						

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				334 efficiency of gasoline engine 334 efficiency of electric motors	
7.1.A.a Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation	Formulate testable questions and hypotheses	8 formulating a hypothesis 8 hypothesis defined 8 asking a scientific question	6 form a hypothesis 30 state a hypothesis about the water's energy 94 state a hypothesis about period of pendulum 96 state a hypothesis about the natural frequency of the oscillator

Correlation to Missouri Science Expectations, Grade 9 - 11

CPO Science - Physics: A First Course

Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
7.1.A.b Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation	Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment	6 8 8 8 8 16 16 24	6 27 94
7.1.A.c Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation	Design and conduct a valid experiment	4 8	6 13 15 47 47 94

Correlation to Missouri Science Expectations, Grade 9 - 11

CPO Science - Physics: A First Course

Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
7.1.A.d Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation	Recognize that sometimes it is not possible, for practical or ethical reasons, to control some conditions	6 8 8 8 16 16 24	6 27 94
7.1.A.e Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation	Acknowledge that some scientific explanations cannot be tested using the standard experimental "scientific method" due to the limits of the laboratory environment, resources, and/or technologies	8 22	

Correlation to Missouri Science Expectations, Grade 9 - 11

CPO Science - Physics: A First Course

Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
7.1.A.f Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation	Acknowledge that there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected, relevant evidence, logical reasoning, and some imagination	22 22 22 23 28 167 186 218 219 224	discovery of Penicillin Fleming's investigations unexpected discoveries science is a creative enterprise Newton's idea of force history of atomic theory creativity and discoveries of Charles Goodyear atomic theory development of atom models development of periodic table
7.1.A.g Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation	Evaluate the design of an experiment and make suggestions for reasonable improvements	8	cause and effect relationships

Correlation to Missouri Science Expectations, Grade 9 - 11

CPO Science - Physics: A First Course

Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page		Volume Two Investigation Manual Page	
7.1.B.a Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data	11	measurement	44	make a precise time measurement
				12	metric system		
				13	measuring time	61	collect and record resistance data

Correlation to Missouri Science Expectations, Grade 9 - 11

CPO Science - Physics: A First Course

Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
7.1.B.b Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second	11 understand length measurement 12 systems of measurement 13 time measurement units 14 basic unit of time 29 measuring mass 30 measuring force 170 converting between Fahrenheit and Celsius 170 measuring temperature 175 Kelvin and Celsius scales	1 mixed units for time 8 make mass measurements 10 make length measurement 12 record the times 14 measure mass of car 17 measure string length 19 measure the force 22 measure force 23 measure the mass 24 measure the time 28 measure height of track 30 measure final temperature 31 measure final temperature 33 measure final temperature 33 measure mass of ice and cup 44 measure mass of car 46 measure mass of car 48 measure temperature 49 measure temperature 50 measure temperature 50 measure volume 50 measure mass

Correlation to Missouri Science Expectations, Grade 9 - 11

CPO Science - Physics: A First Course

Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
					76 measure mass of capacitor

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
7.1.B.c Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	Determine the appropriate tools and techniques to collect, analyze and interpret data	11 measurement 12 metric system 13 measuring time 171 how a thermometer works 305 using a multimeter to measure current 307 using a multimeter to measure resistance	2 using timers and photogates 22 use spring scales 44 using a timer and photogates 46 using a timer and photogates 59 use a multimeter 61 using a multimeter to measure resistance 62 use a multimeter to measure current 63 use a multimeter to measure resistance of a pot 64 use a multimeter to measure voltage drop 65 use a multimeter to measure voltage 66 use a multimeter to measure current 74 use a multimeter to measure voltage 85 use a multimeter to measure voltage 86 use a timer and photogate to measure speed of rotor

Correlation to Missouri Science Expectations, Grade 9 - 11

CPO Science - Physics: A First Course

Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
					93 use a timer and photogate to measure the period of a pendulum 96 use a timer and photogate to measure the natural frequency of an oscillator
7.1.B.d Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	Judge whether measurements and computation of quantities are reasonable	10 what is a model	3 car launching technique is a possible source of error 4 car launching technique is a possible source of error 21 how close is your prediction to the actual measurement? 26 spotting the landing point of the marble is tricky 27 marble launching technique is a possible source of error
7.1.B.e Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	Calculate the range, average/mean, percent and ratios for sets of data	4 what is analysis	52 find a percentage 71 find the average of the three times

Correlation to Missouri Science Expectations, Grade 9 - 11

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
7.1.B.f Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	Recognize that observation is biased by the experiences and knowledge of the observer		<p>3 car launching technique is a possible source of error</p> <p>4 car launching technique is a possible source of error</p> <p>21 how close is your prediction to the actual measurement?</p> <p>26 spotting the landing point of the marble is tricky</p> <p>27 marble launching technique is a possible source of error</p>
7.1.C.a Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Evidence is used to formulate explanations	Use quantitative and qualitative data to construct reasonable explanations (conclusions)	8 cause and effect relationships	<p>6 reflecting on the experiment</p> <p>7 construct explanations supported by evidence</p> <p>9 how do your observations support your answer?</p> <p>11 what experimental data support answer?</p> <p>47 construct a reasonable explanation</p> <p>60 propose a relationship between power and voltage</p>

Correlation to Missouri Science Expectations, Grade 9 - 11

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page		
7.1.C.b Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Evidence is used to formulate explanations	Analyze experimental data to determine patterns, relationship, perspectives and credibility (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)	16	constructing graphs	4	construct a graph
				16	steps to follow for graph construction	11	find formula for acceleration
				19	mathematical descriptions	11	create a graph
				25	constructing a graph	13	derive a formula
				26	interpreting distance/time graph	15	graph speed vs. height
				34	mathematical model of acceleration	17	derive a formula to use with ropes and pulleys
				35	Newton's second law equation	17	calculate mechanical advantage
				41	average speed equation	20	graph work done vs. deflection of rubber band
				43	calculating weight	21	graph speed vs. rubber band deflection
				46	motion graphs	25	graph friction vs. mass
				48	motion graphs	27	graph launch angle vs. range
				61	momentum equation	29	calculate the ratio
				62	relating impulse and momentum conservation	29	find a mathematical name for the steepness ratio
				68	kinetic energy formula	29	graph acceleration vs. steepness ratio
				86	the work equation	31	calculate temperature of mixture
				89	the power equation	45	make a graph of efficiency vs. speed
				96	calculating mechanical advantage		
112	using a graph to find force vector components						
118	Hooke's law equation						

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
				141	projectile motion problems
				143	calculating angular speed
				144	finding the circumference of a circle
				145	linear speed equation
				153	equation for law of universal gravitation
				179	the heat equation
				193	density formula
				208	pressure and temperature relationship
				308	equation for Ohm's law
				342	equation for Coulomb's law
				419	harmonic motion graphs
				420	finding the amplitude on a harmonic motion graph
				438	calculating wave speeds
				439	equation for the speed of a wave
				525	equation for the speed of light
				50	graph time vs. temperature
				52	construct a graph
				69	calculate power used by the bulb
				75	graph current vs. time for the capacitor
				75	derive a formula to calculate the charge
				76	calculate the number of electrons
				86	graph voltage vs. speed
				94	sketch harmonic motion graphs
				99	calculate natural frequency and period
				154	calculate gear ratio

Correlation to Missouri Science Expectations, Grade 9 - 11

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
7.1.C.c Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Evidence is used to formulate explanations	Identify the possible effects of measurement and calculation errors on the validity and reliability of data	10 what is a model	3 car launching technique is a possible source of error 4 car launching technique is a possible source of error 21 how close is your prediction to the actual measurement? 26 spotting the landing point of the marble is tricky 27 marble launching technique is a possible source of error
7.1.D.a Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry includes evaluation of explanations (hypotheses, laws, theories) in light of scientific principles (understandings)	Analyze whether evidence supports proposed explanations (hypotheses, laws, theories)	10 what is a model	31 did result agree with hypothesis?

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
7.1.D.b Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	Scientific inquiry includes evaluation of explanations (hypotheses, laws, theories) in light of scientific principles (understandings)	Evaluate the reasonableness of an explanation (conclusions)		<p>6 reflecting on the experiment</p> <p>7 construct explanations supported by evidence</p> <p>9 how do your observations support your answer?</p> <p>11 what experimental data support answer?</p> <p>47 construct a reasonable explanation</p> <p>60 propose a relationship between power and voltage</p>

Correlation to Missouri Science Expectations, Grade 9 - 11

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page			
7.1.E.a Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	The nature of science relies upon communication of results and justification of explanations	Communicate the procedures and results of investigations and explanations through: oral presentations, drawings and maps, data tables, graphs, equations, and writings	11	importance of units	each investigation contains a "thinking about what you observed" section, and students must be able to communicate and defend their findings from the investigation		
				11	communicating via measurement			
				26	applying your knowledge: three opportunities to research topics and write reports			
				132	explain your answer using diagrams		67	explain what happened
				132	applying your knowledge: two opportunities to research topics and write reports		153	draw a schematic diagram
				163	applying your knowledge: two opportunities to research topics and write reports		154	create a report
				295	applying your knowledge: three opportunities to research topics and write reports			

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
7.1.E.b Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	The nature of science relies upon communication of results and justification of explanations	Communicate and defend a scientific argument	11 importance of units 11 communicating via measurement 26 applying your knowledge: three opportunities to research topics and write reports 132 explain your answer using diagrams 132 applying your knowledge: two opportunities to research topics and write reports 163 applying your knowledge: two opportunities to research topics and write reports 295 applying your knowledge: three opportunities to research topics and write reports	each investigation contains a "thinking about what you observed" section, and students must be able to communicate and defend their findings from the investigation

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
7.1.E.c Scientific Inquiry	Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	The nature of science relies upon communication of results and justification of explanations	Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community	11 importance of units 11 communicating via measurement 26 applying your knowledge: three opportunities to research topics and write reports 132 explain your answer using diagrams 132 applying your knowledge: two opportunities to research topics and write reports 163 applying your knowledge: two opportunities to research topics and write reports 295 applying your knowledge: three opportunities to research topics and write reports	each investigation contains a "thinking about what you observed" section, and students must be able to communicate and defend their findings from the investigation 4 use photogate A to monitor repeatability 27 practice your technique until it is repeatable 154 create a report

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page	
8.1.B.a Impact of Science, Technology and Human Activity	The nature of technology is advanced by and can advance science as it seeks to apply scientific knowledge in ways that meet human needs	Advances in technology often result in improved data collection and an increase in scientific information	Recognize the relationships linking technology and science	53	relationship between science and technology	112 research how computer monitors and televisions make colros 161 making a model maglev train
				78	rocket technology	
				79	new technologies	
				104	prosthetic legs and technology	
				122	maglev train technology	
				213	deep water submarine technology	
				235	technology and archaeology	
				273	how a smoke detector works	
				458	recording sound	
532	applications of polarization					

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
8.1.C.a Impact of Science, Technology and Human Activity	The nature of technology is advanced by and can advance science as it seeks to apply scientific knowledge in ways that meet human needs	Technological solutions to problems often have drawbacks as well as benefits	Identify and evaluate the drawbacks and benefits of technological solutions to a given problem	53	relationship between science and technology
				78	rocket technology
				79	new technologies
				213	deep water submarine technology
				235	technology and archaeology
				273	how a smoke detector works
				458	recording sound
532	applications of polarization				
8.2.A.a Impact of Science, Technology and Human Activity	A historical perspective of scientific explanations helps to improve understanding of the nature of science and how science knowledge and technology evolve over time	People from various cultures, races, and of different gender have contributed to the scientific discoveries and the invention of technological innovations	Recognize that contributions to science have not been limited to the work of one particular group, but instead have been made by a diverse group of scientists representing various cultures, races, and gender	28	Newton's idea of force
				218	contributions of John Dalton
				219	contributions of Rutherford
				219	contributions of J. J. Thomson
				224	development of periodic table
				230	contributions of Bohr
				231	Pauli's contributions
				231	contributions of Schrödinger
232	contributions of Heisenberg				

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
8.2.A.b Impact of Science, Technology and Human Activity	A historical perspective of scientific explanations helps to improve understanding of the nature of science and how science knowledge and technology evolve over time	People from various cultures, races, and of different gender have contributed to the scientific discoveries and the invention of technological innovations	Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	52	contributions of Harold Edgerton
				79	contributions of Robert Goddard
				167	history of atomic theory
				218	contributions of John Dalton
				218	atomic theory
				219	contributions of Rutherford
				219	contributions of J. J. Thomson
				219	development of atom models
				230	contributions of Bohr
				231	Pauli's contributions
231	contributions of Schrödinger				
232	contributions of Heisenberg				

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
8.2.B.a Impact of Science, Technology and Human Activity	A historical perspective of scientific explanations helps to improve understanding of the nature of science and how science knowledge and technology evolve over time	Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity	Identify and describe how explanations (hypotheses, laws, theories) explaining scientific phenomena have changed over time as a result of new evidence	22 22 28 167 218 219 224	discovery of Penicillin Fleming's investigations Newton's idea of force history of atomic theory atomic theory development of atom models development of periodic table
8.2.B.b Impact of Science, Technology and Human Activity	A historical perspective of scientific explanations helps to improve understanding of the nature of science and how science knowledge and technology evolve over time	Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity	Identify and analyze current theories that are being questioned and compare them to new theories that have emerged to challenge the older ones	22 22 28 167 218 219 224	discovery of Penicillin Fleming's investigations Newton's idea of force history of atomic theory atomic theory development of atom models development of periodic table
8.3.B.a Impact of Science, Technology and Human Activity	Science is a human endeavor	Social, political, economic, ethical, and environmental forces strongly influence and are influenced by the direction of progress of science and technology	Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress	23 23	impact of medical breakthroughs science helps us learn about natural world

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
8.3.B.b Impact of Science, Technology and Human Activity	Science is a human endeavor	Social, political, economic, ethical, and environmental forces strongly influence and are influenced by the direction of progress of science and technology	Identify and describe major scientific and technological challenges to society and their ramifications for public policy	72	energy usage and conservation
				247	burning gasoline and low efficiency
				247	sources of electrical power in the United States
				254	generating electricity from the ocean's energy
				255	impact of generating electricity on the environment
				255	energy in the ocean
				335	using hybrid cars
				157	compare economic and environmental impact of using different energy sources
				157	research electricity generation methods

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
8.3.B.c Impact of Science, Technology and Human Activity	Science is a human endeavor	Social, political, economic, ethical, and environmental forces strongly influence and are influenced by the direction of progress of science and technology	Analyze and evaluate the social, political, economic, ethical, and environmental factors affecting science and technology	53 relationship between science and technology 78 rocket technology 79 new technologies 104 prosthetic legs and technology 122 maglev train technology 213 deep water submarine technology 235 technology and archaeology 273 how a smoke detector works 458 recording sound 532 applications of polarization	112 research how computer monitors and televisions make colros 161 making a model maglev train
8.3.C.a Impact of Science, Technology and Human Activity	Science is a human endeavor	Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent	Identify and evaluate the need for informed consent in experimentation		16 safety with simple machines 48 demonstrate safe lab practices 67 short circuits and lab safety 70 capacitor safety

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
8.3.C.b Impact of Science, Technology and Human Activity	Science is a human endeavor	Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent	Identify the ethical issues involved in experimentation (i.e., risks to organisms or environment)	23 impact of medical breakthroughs	

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Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page		
8.3.C.c Impact of Science, Technology and Human Activity	Science is a human endeavor	Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent	Identify and evaluate the role of models as an ethical alternative to direct experimentation	10	what is a model	4	construct a graph
				16	constructing graphs	11	create a graph
				16	steps to follow for graph construction	15	graph speed vs. height
				19	mathematical models	20	graph work done vs. deflection of rubber band
				25	constructing a graph	21	graph speed vs. rubber band deflection
				46	motion graphs	25	graph friction vs. mass
				48	motion graphs	27	graph launch angle vs. range
				112	using a graph to find force vector components	29	graph acceleration vs. steepness ratio
				419	harmonic motion graphs	45	make a graph of efficiency vs. speed
				420	finding the amplitude on a harmonic motion graph	50	graph time vs. temperature
						52	construct a graph
		75	graph current vs. time for the capacitor				
		86	graph voltage vs. speed				
		94	sketch harmonic motion graphs				

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
8.3.D.a Impact of Science, Technology and Human Activity	Science is a human endeavor	Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible	Evaluate a given source for its scientific credibility (e.g., articles in new periodical quoting an "eye witness", a scientist speaking within or outside his/her area of expertise)	22	discovery of Penicillin
				22	Fleming's investigations
					3 car launching technique is a possible source of error
					4 use photogate A to monitor repeatability
					4 car launching technique is a possible source of error
					21 how close is your prediction to the actual measurement?
					26 spotting the landing point of the marble is tricky
					27 practice your technique until it is repeatable
					27 marble launching technique is a possible source of error

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Student Text and Investigation Manual

Standard #: Standard	Objective	Concept	Expectations	Volume One Student Text Page	Volume Two Investigation Manual Page
8.3.D.b Impact of Science, Technology and Human Activity	Science is a human endeavor	Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible	Explain why accurate record- keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society		<p>4 use photogate A to monitor repeatability</p> <p>6 use a data table</p> <p>8 constant force data table</p> <p>9 constant height data table</p> <p>10 speed data table</p> <p>13 collision data table</p> <p>18 output and input work data table</p> <p>19 force vs. distance data table</p> <p>22 force data table</p> <p>25 rolling friction data table</p> <p>27 practice your technique until it is repeatable</p> <p>29 speed and height data table</p> <p>67 explain what happened</p> <p>154 create a report</p> <p>154 create a data table</p>