

# Correlation to Oklahoma Priority Academic Student Skills: High School Science

## Foundations of Physics

### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page				
Ph.1.1 Physics	Content Standard	Motions and Forces	Objects change their motion only when a net force is applied. Newton's laws of motion are used to calculate precisely the effects of forces on the motion of objects.	36	the precise meaning of speed	9	calculate speed of rolling marble		
				37	calculating speed	9	collect data and calculate speed of car		
				37	how to calculate speed	10	make object move with speed of 1 m/sec		
				38	the speed formula and calculating speed	12	finding speed of ball with one photogate		
				41	speed of a ball on a ramp	14	find the speed of the ball		
				46	speed is the rate of change of position	15	find speed of the ball		
				47	average and instantaneous speed	16	create a position vs. time graph		
				47	position vs. time graph	16	create a speed vs. time graph		
				48	determining speed from the slope of a position vs. time graph	17	find two speeds		
				48	determining speed from the slope of a position vs. time graph	17	studying acceleration		
				49	speed vs. time graph for constant speed	17	learn techniques for finding acceleration		
				50	speed vs. time graph for downhill motion	19	make a speed vs. time graph		
				54	graphing speed vs. time	20	speed vs. time graph for uniform acceleration		
				55	calculate the average speed and distance traveled	20	understanding equation for uniform accelerated motion		
				55	analyzing distance vs. time graph	21	calculate speed of ball		
								22	create a position vs. time graph

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
				58	acceleration is the rate of change in the speed of an object	22	create a speed vs. time graph
				59	comparing speed and acceleration	26	collect data on Newton's first law
				60	formula for acceleration	26	make ball roll at constant speed
				61	any acceleration must come from a force	26	study Newton's first law
				61	general definition of acceleration	27	explain how Newton's first law applies
				62	speed vs. time graph for accelerated motion	27	were any forces acting on the ball?
				62	acceleration is total change of speed divided by total change in time	28	investigate Newton's second law
				63	complex speed vs. time graphs	30	investigate Newton's third law
				64	calculate speed in accelerated motion	30	Newton's third law and free body diagrams
				64	calculating the speed of an object that is accelerating	31	draw free body diagrams and identify action-reaction pairs
				65	calculating distance from speed vs. time graph	33	calculate the predicted speed
				74	describing motion with speed vs. time graph	42	find initial speed of ball
				74	understanding average speed and instantaneous speed	44	investigating force vectors
				75	calculations of speed	45	balancing a specified force
						49	draw a free body diagram and label forces
						49	consider forces acting on the ball

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
				78	force is an action that can change motion	50	calculate the speed of the ball
				78	changes in motion only occur through force	66	find the speed of the ball
				79	what systems in a car overcome the law of inertia	68	what is speed of the ball?
				79	all objects tend to resist changes in motion	76	calculate speeds of projectile and target balls
				80	seat belts and air bags and Newton's first law	77	relationship between force and motion and the second law
				80	Newton's laws and cup holders	78	which ball had a greater change in momentum?
				80	Newton's second law of motion	90	calculate the speed of the wave pulse
				81	Newton's second law of motion	191	calculate speed of air in homemade air-speed tester
				81	force is related to acceleration		
				83	finding the net force		
				83	calculation using Newton's second law		
				84	direction of net force and acceleration and speed		
				84	Newton's second law and dynamics problems		
				84	calculating net force		
				85	finding force from acceleration		
				85	force problems		

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				85	
					if there is acceleration there must be force
				86	
					zero acceleration means net zero force
				87	
					forces always occur in action-reaction pairs
				87	
					explaining Newton's third law in terms of an astronaut moving through space
				88	
					Newton's third law operates on pairs of objects
				88	
					explaining Newton's third law in terms of moving a skateboard
				89	
					identifying which force is acting on which object
				89	
					solving problems with action-reaction forces
				90	
					examples of Newton's third law
				93	
					problems using Newton's first law and second law
				94	
					seat belt problem
				99	
					balanced force problems
				100	
					friction is a force that resists motion

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				102	
					the normal force as the reaction in an action-reaction pair
				103	
					net force includes the force of friction
				106	
					net force must be zero in equilibrium
				106	
					Newton's second law and net force
				107	
					forces on a free-body diagram
				107	
					net force of zero and free-body diagram
				108	
					equilibrium and Newton's second law
				108	
					use equilibrium to find an unknown force
				111	
					understanding reaction forces in terms of springs and deformation
				112	
					analysis of forces on a bridge
				116	
					calculate the acceleration of a toy
				132	
					the force vector describes the strength and direction of a force
				133	
					balancing forces in two dimensions

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				135	
					normal force of an inclined plane
				136	
					calculate the acceleration of a skier on a slope
				136	
					calculating acceleration on a ramp
				137	
					predicting motion in three dimensions and controlling force and acceleration in space missions
				137	
					calculating acceleration from 3-D forces
				137	
					the vector form of Newton's second law
				139	
					determining position by triangulation and inertial navigation
				141	
					calculate the net force
				146	
					calculating linear speed of a moving wheel
				147	
					the linear speed of a rolling wheel
				148	
					centripetal force causes circular motion
				148	
					direction of force determines linear or rotational motion
				149	
					calculating centripetal force

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				150	
					using centripetal acceleration to create the feeling of gravity by rotating the space station
				150	centripetal acceleration
				150	formula for centripetal acceleration
				151	banked turns
				155	satellite motion application
				156	satellites in orbit
				168	Newton's first law and rotational inertia
				169	Newton's second law applies to rotational motion
				171	Newton's second law for rotational motion variables
				186	work done by a force at an angle to the distance
				222	Newton's first law and momentum
				224	law of conservation of momentum
				224	momentum and Newton's third law
				225	conservation of momentum in collisions
				226	applying conservation of momentum

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				227	
					momentum conservation for collisions in two and three dimensions
				228	seat belts and air bags
				228	Newton's second law relating force and momentum
				229	momentum form of Newton's second law
				231	conservation of angular momentum examples
				232	conservation of angular momentum
				234	gyroscopes and the space shuttle
				235	jet engines work because of conservation of momentum
				238	cars that crumple in a collision
				240	forces in a car stopping
				252	Newton's second law and natural frequency
				254	definition of periodic force
				260	velocity vs. time graph of harmonic motion
				260	position vs. time graph of harmonic motion

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				370	Einstein's thinking about momentum of particles moving near the speed of light
				425	electric forces always occur in pairs according to Newton's third law
				548	Newton's third law and pressure in a fluid
				550	pressure and the third law
				557	pressure of gases
				629	conservation of momentum in nuclear reactions

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
Ph.1.2 Physics	Content Standard	Motions and Forces	Gravitation is a universal force that each mass exerts on any other mass. The strength of the gravitational attractive force between two masses is proportional to the masses and inversely proportional to the square of the distance between them.	68	free fall and acceleration due to gravity	23	investigate the effect of gravity
				69	motion formulas for free fall	51	calculate gravitational force of attraction
				70	solving problems with free fall	51	investigate law of universal gravitation
				71	acceleration of gravity does not depend on mass		
				75	problem understanding acceleration due to gravity		
				97	strength of gravity on Earth and Jupiter		
				98	gravity and acceleration and weightlessness		
				124	projectiles and trajectories		
				128	gravity only accelerates vertical motion		
				129	vertical motion of a projectile		
				130	projectiles launched at an angle		
				131	range of projectiles		
				134	resolving force of gravity in ramp coordinates		
				135	acceleration down an inclined plane		
141	effects of gravity on motion of a projectile						

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				152	
					description of law of universal gravitation
				152	law of universal gravitation and orbital motion
				153	formula and calculations for law of universal gravitation
				154	orbital motion
				154	orbits and gravitational force
				155	centripetal force and the law of universal gravitation combine to form the orbit equation
				158	compare projectile motion to orbital motion
				158	calculate weight and acceleration due to gravity on Pluto
				165	the motion of a tossed object
				166	centers of mass and gravity may differ
				187	work done against gravity
				191	potential energy comes from gravity
				216	tides are due to force of gravity
				642	Newton's laws and gravity

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
Ph.1.3 Physics	Content Standard	Motions and Forces	The electric force is a universal force that exists between any two charged objects. The strength of the force is proportional to the charges and, as with gravitation, inversely proportional to the square of the distance between them.	418 electric charge is a fundamental property of matter 419 differences between electric force and gravity 419 electric forces are created between electric charges 420 explanation of coulomb 421 current is the flow of charge 422 negative charge of electrons and current flow 423 static electricity and charge polarization and induction 424 relationship of electric force and charge 424 the strength of electric forces 425 the force between charges 426 fields and forces 426 gravity is far weaker than electric forces 426 charge creates an electric field 427 an electric field exists around a charge 428 source charges and test charges	146 build a simple electroscope 147 investigate the concept of electric charge 149 investigate charged balloons 154 how are magnetic field lines similar to electric field lines?

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				428	
				430	
				433	
				437	
				441	
				442	
				443	
				649	

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page			
Ph.1.4 Physics	Content Standard	Motions and Forces	Electricity and magnetism are two aspects of a single electromagnetic force.	356	electricity and magnetism oscillations	129	electrical safety	
				378	concept of electric current	129	construct simple electric circuits	
				379	concept of a circuit	129	short circuit precautions	
				380	understanding simple circuit and its diagram	130	draw and interpret circuit diagrams	
				380	circuit diagrams and electrical symbols	130	understand the difference between open and closed circuits	
				381	definition of short circuit	131	electrical safety	
				381	how batteries work in a circuit	131	short circuit precautions	
				381	open and closed circuits	131	construct a simple circuit	
				382	voltage measures differences in energy	131	explore the concept of electric current	
				382	electrical current explained	132	explore the concept of voltage	
				382	current flows through wires and carries energy	134	study the relationship between resistance and current	
				383	voltage is a measure of electric potential energy	134	apply the concept of electrical resistance	
				383	voltage and potential energy	134	Ohm's law	
				384	batteries use chemical reactions to provide energy to a circuit	135	derive Ohm's law from experiment	
				384	battery uses chemical energy to produce electrical charge	135	study the relationship between current and voltage	
							136	use Ohm's law to calculate the resistance

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				385	137
			protect circuits from overloading		investigate series circuits
			386	386	137
			relationship between current and resistance		parallel circuit and Ohm's law
			386	386	138
			concept of electrical resistance		build a parallel circuit
			386	386	138
			simple bulb and battery circuits to illustrate electrical resistance		apply Ohm's law to series circuits
			387	386	138
			measuring resistance		determining total resistance in a series circuit
			388	387	139
			Ohm's law		analyze parallel circuits
			388	388	139
			calculate the current flowing in a circuit		compare series and parallel circuits
			389	388	140
			the danger of water and 120-volt electricity in terms of resistance and voltage and current		build and analyze network circuits
			389	389	143
			the resistance of electrical devices		find the power rating of home appliances
			390	389	150
			resistance of conductors and insulators		investigate how capacitors work
			390	390	150
			classifying materials as conductor or insulator or semiconductor		short circuit precautions
			391	390	151
			resistors		what is the difference between a capacitor and a battery?
			393	391	159
			hybrid car battery technology		build an electromagnet
			395	393	159
			classify conductivity of materials		build an electromagnet
				395	159
					battery safety
					160
					what happens to the strength of an electromagnet when you increase the current?

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
				395	where does energy supplied by a battery come from?	160	find out what happens to strength of electromagnet when current is increased
				395	knowing difference between types of resistors	160	study the right-hand rule
				396	calculation of voltage from resistance and current	160	find out what happens to strength of electromagnet when current is increased
				398	parallel circuit defined	160	what happens to the strength of an electromagnet when you increase the current?
				398	series circuit defined		
				399	adding resistance in a series circuit	164	calculate the power consumed by the motor
				399	current and resistance in a series circuit	165	investigate electromagnetic induction
				399	calculating current in a series circuit using Ohm's law	166	build a generator
				400	voltage in a series circuit	171	use Ohm's law to calculate the resistance of the transistor
				400	batteries and cells		
				400	Kirchoff's voltage law		
				401	parallel circuits		
				401	Kirchhoff's current law		
				402	voltage and current in a parallel circuit		
				402	advantages of parallel circuits over series circuits		
				402	short circuits		

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				403	
					resistance in parallel circuits
				403	
					using Ohm's law in parallel circuits
				404	
					using Kirchhoff's current law for circuit analysis
				404	
					using Kirchhoff's voltage law for circuit analysis
				404	
					using Ohm's law for circuit analysis
				405	
					voltage dividers
				405	
					analyzing a voltage divider circuit
				406	
					comparing series and parallel circuits
				407	
					solving network circuits
				407	
					solving network circuits
				407	
					calculate currents and voltages in a network circuit
				408	
					current definition
				408	
					resistance definition
				408	
					voltage definition
				409	
					formula for calculating power in electric circuits
				411	
					definition of DC current
				411	
					definition of AC current

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				412	
					calculating power for AC circuits using a power factor
				413	
					ground fault interrupt (GFI) outlets and ground wires
				414	
					why series circuits are not used in homes and buildings
				414	
					why parallel circuits are used in homes and buildings
				414	
					what happens if you plug too many things into a socket
				415	
					compare current in a series and parallel circuit
				415	
					explain short circuit
				416	
					using Ohm's law to calculate current
				416	
					calculating resistance in a circuit
				421	
					current is the flow of charge
				422	
					negative charge of electrons and current flow
				430	
					capacitor is a storage device for electric charge
				431	
					simple capacitor circuit

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				431	circuit symbol for a capacitor
				431	voltage of a capacitor circuit
				431	current into and out of capacitors
				432	how a capacitor works and making a simple capacitor
				432	safety precautions of capacitor
				433	calculating capacitance
				435	steering the electron beam on television screen
				435	steering the electron beam on television screen
				438	calculating capacitance
				441	comparing magnetic and electric forces
				442	force between two magnetics is not an inverse square law
				456	magnetic field of a wire
				456	magnetic field of a wire
				457	right-hand rule
				457	force on a current in a magnetic field
				457	force on a current in a magnetic field

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				458	
					coils and solenoids
				459	
					the magnetic field of coils and permanent magnets
				461	
					calculate magnetic field at the center of a coil
				462	
					electromagnets
				462	
					finding the poles of an electromagnet using right-hand rule
				462	
					electromagnets
				462	
					coils used in electromagnets
				463	
					building an electromagnet
				463	
					building an electromagnet
				463	
					adding turns increases an electromagnet's strength
				464	
					electric motor uses electromagnets to convert electrical energy to mechanical energy
				464	
					electric motor uses electromagnets to convert electrical energy to mechanical energy
				465	
					how electromagnets are used in electric motors
				465	
					how electromagnets are used in electric motors
				466	
					AC motors

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				467	concept of electromagnetic induction
				470	generating electricity by induction
				470	generators are source of alternating current
				471	transformers operate on electromagnetic induction
				471	transformers only work with AC current
				472	electromagnet-based maglev
				472	electromagnet-based maglev
				475	using right-hand rule
				475	diagram of electromagnet
				475	diagram of electromagnet
				478	diodes and AC to DC adapters
				478	diodes and AC to DC adapters
				479	resistance of a transistor
				484	rectifier circuit converts AC electricity to DC
				484	rectifier circuit converts AC electricity to DC

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Ph.2.1 Physics	Content Standard	Conservation of Energy	Energy can be transferred but never destroyed. As these transfers occur, the matter involved becomes steadily less ordered.	189	energy appears in different forms	66	law of conservation of energy
				190	different forms of energy	67	friction as a source of energy dissipation
				190	conversions of energy	68	find the total energy at each position
				194	energy transformations	72	potential to kinetic energy conversion in a pendulum
				194	conservation of energy explained	72	draw an energy flow diagram
				194	the law of conservation of energy	74	investigating collisions and conservation of energy
				194	energy transformations	88	potential to kinetic energy conversions of a pendulum
				195	friction can divert some energy		
				195	conservation of energy in a closed system		
				195	applying conservation of energy for a marble rolling on a hilly track		
				196	energy transformation hydroelectric plant		
				196	energy transformation hydroelectric plant		
				197	conservation of energy for Hoover Dam		
				199	kinetic and potential energy conversions while bouncing in a trampoline		
199	trace the energy transformations from sun to a flashing taillight						

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				202	efficiency and energy conversions
				203	how friction affects machines
				203	efficiency and conservation of energy
				204	efficiency of Earth
				205	efficiency in biological systems
				205	calories in food
				206	friction and the arrow of time
				206	connection between efficiency and time
				210	energy from the sun drives the weather on Earth
				212	energy flow in a pendulum
				212	understand basic forms of energy
				212	energy conversion
				213	the conversion process of energy flow
				215	energy flows in biological systems
				215	energy flows in biological systems

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				216	
				219	
				227	
				245	
				245	
				253	
				256	
				277	
				310	
				320	
				322	
				324	

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				356	
					electromagnetic waves exchange energy between electricity and magnetic parts
				370	
					relationship and conservation of mass and energy
				378	
					electrical energy
				384	
					batteries use chemical energy
				393	
					conversion of energy in regenerative braking
				400	
					energy conversions in a series circuit
				451	
					MRI--energy exchange by a nucleus in a magnetic field
				464	
					electric motor uses electromagnets to convert electrical energy to mechanical energy
				467	
					electric generators transform mechanical energy into electric energy
				469	
					energy conservation and Faraday's law
				515	
					thermodynamics and conservation of energy
				552	
					explanation of pressure and energy

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				552	
					conservation of energy in fluids
				553	
					energy conservation and Bernoulli's equation
				597	
					the energy of chemical bonds is described
				619	
					radiation as a flow of energy
				622	
					energy of x-rays
				625	
					energy changes in nuclear reactions
				626	
					source of energy in nuclear reactions
				627	
					energy of fusion reactions
				627	
					fusion reactions and the sun
				628	
					energy of fission reactions
				629	
					conservation of energy in nuclear reactions
				647	
					energy from antimatter

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
Ph.2.2 Physics	Content Standard	Conservation of Energy	All energy can be considered to be kinetic energy, potential energy, or energy contained by a field.	189	energy appears in different forms	66	law of conservation of energy
				190	different forms of energy	68	calculate potential and kinetic energy
				191	the formula for potential energy	68	find the total energy at each position
				192	the formula for kinetic energy	74	investigating collisions and conservation of energy
				193	deriving the formula for kinetic energy		
				195	applying conservation of energy for a marble rolling on a hilly track		
				197	conservation of energy for Hoover Dam		
				212	understand basic forms of energy		
				253	harmonic motion involves both potential and kinetic energy		
				310	light is a form of energy		
				322	photons are bundles of light energy		
				378	electrical energy		
				384	batteries use chemical energy		
				552	explanation of pressure and energy		
619	radiation as a flow of energy						

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				622 energy of x-rays	
				647 energy from antimatter	

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
Ph.2.3 Physics	Content Standard	Conservation of Energy	Heat consists of random motion and the vibrations of atoms, molecules, and ions. The higher the temperature, the greater the atomic or molecular motion.	30	relationship between states of matter and arrangement and motion of atoms and molecules	176	investigate temperature and its effect on materials
				33	describe movement of atoms in solids and gases	178	explore the connection between temperature and heat and energy
				504	temperature scales and Fahrenheit-Celsius conversions	179	specific heat
				505	measuring temperature	180	investigate the thermal conductivity of various materials
				506	temperature and addition of heat energy	182	observe free and forced convection
				506	temperature measures average kinetic energy	182	investigate convection in a liquid
				507	the Kelvin scale and converting between Kelvin and Celsius	184	explore properties of thermal radiation
				508	phases of matter and arrangement of molecules		
				512	temperature and thermal energy and heat		
				514	specific heat and the heat equation		
				519	understanding Fahrenheit and Celsius and Kelvin		
				519	phases of matter		
				520	relationship between temp and average kinetic energy		
				522	heat conduction		

## Correlation to Oklahoma Priority Academic Student Skills: High School Science

### *Foundations of Physics*

### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				523	heat conduction
				524	thermal conductivity
				524	conduction in solids and liquids and gases
				526	free and forced convection
				526	convection in liquids
				527	convection depends on speed and surface area
				528	convection and weather
				530	radiation
				533	using Kelvin for radiation calculations
				533	Stefan-Boltzmann formula
				535	sources of heat transfer in buildings
				558	using temperature in Kelvins for Charles' law

# Correlation to Oklahoma Priority Academic Student Skills: High School Science

## Foundations of Physics

### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page		Volume Two Investigation Manual Page	
Ph.3.1 Physics	Content Standard	Interactions of Energy and Matter	Waves have energy and can transfer energy when they interact with matter. Sound waves and electromagnetic waves are fundamentally different.	247	the phase of an oscillator	83	investigate oscillators in-phase and out-of-phase
				251	concept of natural frequency	85	investigate natural frequency
				252	changing natural frequency	86	investigate resonance and its importance
				254	periodic force and natural frequency	88	if frequency is increased what happens to total energy?
				254	concept of resonance		
				255	resonance occurs when periodic force matches natural frequency	89	study wave pulses on elastic cord
				255	resonance occurs when periodic force matches natural frequency	89	making wave pulses on a string
				259	resonance and amplitude	90	study the speed of the wave pulse
				262	waves are all around us	91	making plane waves in a ripple tank
				262	waves transmit energy	91	make different types of waves in a ripple tank
				263	waves are a form of traveling energy	91	making circular waves in a ripple tank
				264	frequency and amplitude and wavelength in waves	91	is your water wave transverse or longitudinal?
				265	wave pulse		
				265	concept of speed of a wave	92	observing reflection in water waves
				266	formula for speed of a wave	92	investigate reflection in a ripple tank
				267	transverse and longitudinal waves	92	investigate diffraction in a ripple tank

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## *Foundations of Physics*

### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
				267	water waves are transverse and Slinky is longitudinal	94	investigate harmonic wave patterns
				268	one- and two- and three-dimensional waves	94	investigate the wavelength of standing waves
				270	waves and diffraction	94	investigate the frequency of standing waves
				270	waves and reflection		
				270	waves and refraction	95	waves carry energy from one place to another
				270	waves and absorption	95	natural frequency and resonance of standing waves on a string
				270	concept of boundaries		
				271	waves and reflection and boundaries	96	investigate human perception of sound
				271	waves and refraction and boundaries	96	investigate range of frequencies the ear can detect
				271	curved boundaries		
				272	waves and diffraction and boundaries	101	investigate interference with sound waves
				272	waves and absorption and boundaries	125	polarization of water waves
				272	waves transfer energy through absorption	125	polarization of a spring wave
				273	sound and light waves and interference	126	polarization of light
				273	constructive and destructive interference	126	study the polarization of light
				274	how resonance is created		
				274	resonance and reflection		

**Correlation to Oklahoma Priority Academic Student Skills: High School Science**

***Foundations of Physics***

**Student Text and Investigation Manual**

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				274	
					natural frequency of waves
				275	
					standing waves and natural frequency and resonance
				275	
					boundaries and natural frequency
				275	
					standing waves on a string
				276	
					concept of harmonics
				277	
					energy of a wave is proportional to frequency and amplitude
				277	
					standing waves are used to store energy
				277	
					standing waves on a string
				277	
					energy of a wave
				278	
					modes of a wave
				278	
					nodes and antinodes
				278	
					wavelength of a standing wave
				279	
					vibration of a drum
				279	
					modes of vibration
				280	
					microwaves and resonance
				281	
					use of microwaves in microwave ovens
				281	
					microwaves

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**Student Text and Investigation Manual**

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				282	
					describe relationship between wave characteristics
				283	
					type of wave represented by a spring
				286	
					sound is a wave of pressure
				286	
					sound waves require matter to traverse
				287	
					how we hear sound waves
				287	
					frequency and pitch of sound
				288	
					relationship of loudness and amplitude and pressure in sound wave
				288	
					loudness and decibels and the sensitivity of the ear
				289	
					vibrations create sound
				289	
					acoustics
				291	
					how we know sound is a wave
				291	
					pressure and amplitude of sound waves
				291	
					sound vibrates the eardrum
				292	
					frequency and wavelengths of sound
				292	
					importance of wavelength of sound waves

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## *Foundations of Physics*

### Student Text and Investigation Manual

Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				292	
					sound is a longitudinal wave
				294	
					effect of medium and temperature on speed of sound wave
				295	
					resonance of sound
				295	
					designing a musical instrument
				295	
					standing wave patterns of sound
				296	
					design of a good concert hall
				296	
					interference of sound waves
				298	
					constructing meaning from sound
				298	
					sonograms
				299	
					how the ear works
				300	
					music and sound
				300	
					pitch and frequency in music
				301	
					consonance and dissonance and beats
				301	
					echolocation and beats
				302	
					harmonics and frequency and the color of sound
				302	
					musical instruments
				303	
					sound from a guitar

## Correlation to Oklahoma Priority Academic Student Skills: High School Science

### *Foundations of Physics*

#### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				306	beats in a musical sound
				306	list evidence that sound is a wave
				356	electromagnetic waves are oscillations of an energy field
				359	descriptions of radio waves and microwaves and infrared rays
				359	waves of the electromagnetic spectrum
				360	x-rays and gamma rays
				363	polarization
				364	polarizers
				365	applications of polarization
				452	MRI uses radio waves
				530	electromagnetic radiation
				530	energy and radiation relationships
				530	absorption of thermal radiation

**Correlation to Oklahoma Priority Academic Student Skills: High School Science**

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**Student Text and Investigation Manual**

<b>Standard #: Science Cours</b>	<b>Standard type</b>	<b>Standard</b>	<b>Objective</b>	<b>Volume One Student Text Page</b>	<b>Volume Two Investigation Manual Page</b>
Ph.3.2 Physics	Content Standard	Interactions of Energy and Matter	Electromagnetic waves result when a charged object is accelerated or decelerated.	311 fluorescent bulbs create UV light  320 the energy of IR and UV light  320 visible light has just the right energy for life  359 description and examples of infrared waves  360 description and examples of ultraviolet waves  360 visible light waves  531 thermal radiation and infrared light  624 UV light is ionizing radiation	122 study properties of the electromagnetic spectrum

# Correlation to Oklahoma Priority Academic Student Skills: High School Science

## Foundations of Physics

### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
Ph.INQ.1.1 Physics	Process Standard	Observe and Measure	Identify qualitative and quantitative changes given conditions (e.g., temperature, mass, volume, time, position, length) before, during, and after an event.	18	measurements of distance in units of length	2	practice length measurement
				19	description of length measured in English and metric systems	4	measuring time
				19	scientists use metric units	6	precision in measurement
				21	calculating volume of simple shapes	7	estimating mass
				22	time intervals	9	make distance measurement
				23	units for measuring time	18	measure the length
				24	time intervals in physics	23	measure the distance
				25	accuracy and precision of measurements	26	find length in centimeters
				25	understanding precision	29	measure the force
				27	measuring mass in kg and grams	34	measure the mass
				33	commonly used units for measuring mass	34	measure the force
				37	units for speed	36	measure the new position
				58	units of acceleration	36	measure the mass
				60	understanding units of acceleration	46	working with radians
				82	units of force are pounds and newtons	62	measure string length
				82	unit of force is derived	65	measure vertical distance
				83	understanding units for using Newton's second law	68	convert grams to kilograms
				70	measure and mark height		
				78	make the string 70 cm long		
				78	measure mass of ball		
				93	measure frequency		

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## *Foundations of Physics*

### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
				110	units for spring constant	96	measure frequency
				144	units of angular speed	131	measure current in a circuit
				145	using radians per second to measure angular speed	132	measure voltage in a circuit
				157	units of angular speed	137	measure voltage and current in series circuits
				164	torque in English units	148	investigate electrical forces in a penny
				186	units of work are joules	153	making measurements with precision
				244	frequency is measured in hertz	153	make measurement with precision
				382	unit of electric current is the ampere or amp (A)	163	measure direct current
				383	voltage is measured in volts (V)	164	measure voltage of battery pack
				387	electrical resistance is measured in ohms	165	measure voltage
				408	measuring power in watts	169	measure current and voltage
				409	units of watts and horsepower used in electrical circuits	171	measure current and voltage
				410	electric companies charge for kilowatt-hours used	178	measure 100 grams of water
				420	coulomb is the unit of charge	192	find the mass of the bottle
				421	one ampere is the flow of one coulomb per second	192	set the pressure to 10 psi
				428	deriving units for measuring electric fields	193	convert psi to Pa
						202	find the mass

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**Student Text and Investigation Manual**

Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				460 magnetic field strength	202 find the mass to the nearest tenth of a gram
				475 units of magnetic field	
				513 joules and calories and Btus	
				542 units for stress	
				548 units of pressure	

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### *Foundations of Physics*

### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page		Volume Two Investigation Manual Page	
Ph.INQ.1.2 Physics	Process Standard	Observe and Measure	Use appropriate tools (e.g., metric ruler, graduated cylinder, thermometer, balances, spring scales, stopwatches) when measuring objects and/or events.	20	understanding metric rulers	2	measuring a pencil
				23	reading a digital timer	4	using a timer
				91	the force platform	5	using photogates
				383	using a multimeter to measure voltage	7	using devices to measure mass
				385	measuring current with an ammeter or multimeter	9	using timer and photogates
				387	using a multimeter to measure resistance	11	using timer and photogates
				504	Celsius and Fahrenheit thermometers	14	using a timer and photogates
				505	how thermometers work	17	using a timer and photogates
						18	use a ruler
						18	use a timer and photogates
						21	use a timer and photogates
						23	use a timer and photogates
						26	use a timer and photogates
						29	use a meter stick
		29	use a spring scale				
		29	find mass				
		34	use a spring scale				
		36	use a meter stick				

**Correlation to Oklahoma Priority Academic Student Skills: High School Science**

***Foundations of Physics***

**Student Text and Investigation Manual**

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
					39 using a compass
					42 use a timer and photogates
					43 measure the distance
					44 use a spring scale
					47 use a timer and photogate
					50 use a timer and photogate
					58 use a timer and photogate
					60 use a spring scale
					65 use a timer and photogate
					67 use a timer and photogate
					75 use a timer and photogates
					78 use meter stick to measure height
					82 use a timer and photogate
					87 use photogate and timer to measure the period
					89 use a spring scale to measure tension of string
					90 use a timer and photogates
					93 use the timer to measure frequency
					106 experiment with mirrors
					112 use a laser and mirror to study law of reflection

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**Student Text and Investigation Manual**

Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
					112 study reflection with a mirror
					115 use mirrors and lenses to learn how images are formed
					117 use a laser to locate images formed by a lens
					131 use a multimeter to measure current
					132 use a multimeter to measure voltage
					135 use a multimeter to measure current and voltage
					139 use a multimeter
					140 use the multimeter
					157 reading a compass
					163 use a multimeter
					164 use a multimeter to measure voltage
					165 use a multimeter
					166 use a photogate and timer
					169 use a multimeter
					171 use a multimeter
					176 use a thermometer
					178 measure the temperature
					180 measure the temperature

# Correlation to Oklahoma Priority Academic Student Skills: High School Science

## *Foundations of Physics*

### Student Text and Investigation Manual

Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
					192 check the pressure with your gauge 192 use a digital balance

# Correlation to Oklahoma Priority Academic Student Skills: High School Science

## Foundations of Physics

### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page		Volume Two Investigation Manual Page	
Ph.INQ.1.3 Physics	Process Standard	Observe and Measure	Use appropriate System International (SI) units (i.e., grams, meters, liters, degrees Celsius, and seconds); and SI prefixes (i.e., micro-, milli-, centi-, and kilo-) when measuring objects and/or events.	18	measurements of distance in units of length	1	estimating length
				18	measuring distance	2	practice length measurement
				19	scientists use metric units	6	accuracy and resolution and printing
				19	description of length measured in English and metric systems	7	estimating mass
				25	accuracy and precision of measurements	9	make distance measurement
				27	measuring mass in kg and grams	18	measure the length
				33	commonly used units for measuring mass	23	measure the distance
				82	units of force are pounds and newtons	26	find length in centimeters
				83	understanding units for using Newton's second law	29	measure the force
				244	frequency is measured in hertz	34	measure the mass
				382	unit of electric current is the ampere or amp (A)	34	measure the force
				383	voltage is measured in volts (V)	36	measure the new position
				387	electrical resistance is measured in ohms	36	measure the mass
				421	one ampere is the flow of one coulomb per second	43	measure and record the distance
						60	measure input and output forces
						62	measure string length
		65	measure vertical distance				
		67	measure vertical distance				
		68	convert grams to kilograms				
		70	measure and mark height				

**Correlation to Oklahoma Priority Academic Student Skills: High School Science**

***Foundations of Physics***

**Student Text and Investigation Manual**

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
					78 make the string 70 cm long
					78 measure mass of ball
					82 measure the length of the string
					93 measure frequency
					96 measure frequency
					131 measure current in a circuit
					132 measure voltage in a circuit
					137 measure voltage and current in series circuits
					163 measure direct current
					164 measure voltage of battery pack
					165 measure voltage
					169 measure current and voltage
					171 measure current and voltage
					178 measure 100 grams of water
					192 find the mass of the bottle
					202 find the mass

## Correlation to Oklahoma Priority Academic Student Skills: High School Science

### *Foundations of Physics*

### Student Text and Investigation Manual

Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
Ph.INQ.2.1 Physics	Process Standard	Classify	Using observable properties, place an object or event into a classification system.	<p>30 relationship between states of matter and arrangement and motion of atoms and molecules</p> <p>33 describe movement of atoms in solids and gases</p> <p>189 energy appears in different forms</p> <p>190 different forms of energy</p> <p>205 efficiency of plants</p> <p>210 power in natural systems</p> <p>212 understand basic forms of energy</p> <p>213 breaking down an energy flow system into processes</p> <p>310 light is a form of energy</p> <p>322 photons are bundles of light energy</p> <p>378 electrical energy</p> <p>384 batteries use chemical energy</p> <p>447 the magnetic field of Earth</p> <p>508 phases of matter and arrangement of molecules</p> <p>509 melting</p> <p>510 boiling</p>	177 observe a common phase change

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**Student Text and Investigation Manual**

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				511 evaporation and condensation 519 phases of matter 528 convection in the ocean 552 explanation of pressure and energy 566 knowing structure of atom 619 radiation as a flow of energy 622 energy of x-rays 647 energy from antimatter	
Ph.INQ.2.2 Physics	Process Standard	Classify	Identify the properties by which a classification system is based.	318 the additive color process 319 the subtractive color process 321 the RGB and CMYK color processes are complementary 325 color separations in high quality printing 326 the CMYK four-color printing process 434 RGB process and how a television picture is made	108 investigate RGB and CMYK models of color

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### *Foundations of Physics*

#### Student Text and Investigation Manual

Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page		Volume Two Investigation Manual Page	
Ph.INQ.2.3 Physics	Process Standard	Classify	Graphically classify physical relationships (e.g., linear, parabolic, inverse)	43	constructing a graph	13	create a graph
				44	graphical models	16	create a speed vs. time graph
				47	position vs. time graph	16	create a graph
				48	determining speed from the slope of a position vs. time graph	16	describe the graph
				49	speed vs. time graph for constant speed	16	create a position vs. time graph
				50	speed vs. time graph for downhill motion	19	make a speed vs. time graph
				54	constructing a graph	20	speed vs. time graph for uniform acceleration
				54	graphing speed vs. time	22	create a position vs. time graph
				55	create a graph from a data table	22	create a speed vs. time graph
				55	analyzing distance vs. time graph	22	create graphs
				62	speed vs. time graph for accelerated motion	37	make a graph
				63	complex speed vs. time graphs	38	make a graph
				65	calculating distance from speed vs. time graph	43	sketch four graphs
				74	describing motion with speed vs. time graph	56	create a graph
				260	velocity vs. time graph of harmonic motion	66	create a graph of speed vs. position
				260	position vs. time graph of harmonic motion	82	make three different graphs
						87	sketch a graph
						135	graph voltage vs. current
						136	graph voltage vs. current

**Correlation to Oklahoma Priority Academic Student Skills: High School Science**

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**Student Text and Investigation Manual**

Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				290 the process of digital sound reproduction	151 make a graph of voltage vs. time
				411 the waveform of AC electricity	160 create a graph
					167 make a graph of voltage vs. number of magnets
					169 make a current vs. voltage graph for the diode

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## Foundations of Physics

### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page		Volume Two Investigation Manual Page	
Ph.INQ.3.1 Physics	Process Standard	Experiment	Evaluate the design of a physics investigation.	2	understanding natural laws	11	formulate a testable hypothesis
				3	connecting cause and effect through observation	11	recognizing and controlling variables
				8	formulating a hypothesis	12	was this experiment better or worse than the first?
				9	testing ideas against scientific evidence	12	cause and effect relationships
				9	connecting cause and effect through analysis	33	formulate a testable hypothesis
				11	acceptance of the Copernican model of the solar system on the basis of scientific evidence	43	follow the scientific method
				40	defining variables	48	formulate a hypothesis
				42	control and experimental variables	65	form a hypothesis
				43	dependent and independent variables in graphs	79	write a hypothesis
				44	checking a graphical model's accuracy	82	plan three experiments to determine which variable affects the period of a pendulum
				45	recognizing patterns and cause and effect relationships	82	dependent and independent variables
				54	importance of changing one variable at a time in an experiment	82	design an experiment
				54	importance of changing one variable at a time in an experiment	82	determine which variable has the greatest effect
				103	evaluating perpetual motion claims	90	what effect does changing the tension have?
				103	evaluating perpetual motion claims	97	did the method give an accurate result?

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**Student Text and Investigation Manual**

Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				251 changing the natural frequency of a stretched rubber band 432 making a simple capacitor	97 reliability of a double-blind test 166 variables that affect the performance of the generator 201 design a procedure to separate a mixture 201 determine the equipment you will need
Ph.INQ.3.2 Physics	Process Standard	Experiment	Identify the independent variables, dependent variables, and controls in an experiment.	40 defining variables 42 control and experimental variables 43 dependent and independent variables in graphs 54 importance of changing one variable at a time in an experiment 251 changing the natural frequency of a stretched rubber band	11 recognizing and controlling variables 82 determine which variable has the greatest effect 82 dependent and independent variables 166 variables that affect the performance of the generator

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### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
Ph.INQ.3.3 Physics	Process Standard	Experiment	Use mathematics to show relationships within a given set of observations.	60	creating the acceleration formula from experiments
				66	developing the formulas for a model of motion with constant acceleration
				282	write a formula relating velocity of wave to period and wavelength
				312	light intensity follows an inverse square law
				412	average voltage and current of AC power
				13	is there a trend in measurements?
				22	uniform acceleration model
				25	create an algebraic model
				25	find the average time
				28	solve second law equation for string tension
32	develop a model that predicts acceleration				
43	create algebraic model				
49	write a formula				
58	find average of three trials				
63	as mechanical advantage increases what happens to length of pulled string?				
66	what does the graph tell you?				
67	calculate average of three times				
71	calculate average work and power				
82	analyze data				
94	give an equation that describes your observations				
133	did battery voltage change?				

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### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
					189 Bernoulli's equation
Ph.INQ.3.4 Physics	Process Standard	Experiment	Identify a hypothesis for a given problem in physics investigations.	8 formulating a hypothesis	11 formulate a testable hypothesis 33 formulate a testable hypothesis 48 formulate a hypothesis 65 form a hypothesis 79 write a hypothesis
Ph.INQ.3.5 Physics	Process Standard	Experiment	Recognize potential hazards and practice safety procedures in all physics activities.	543 safety factors	79 safety note 129 safety precautions 131 safety precautions 150 safety note 159 safety note 160 electromagnet safety 176 safety note 176 heat safety 185 safety tip 192 gas pressure safety note 206 acid safety

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### Student Text and Investigation Manual

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page		Volume Two Investigation Manual Page	
Ph.INQ.4.1 Physics	Process Standard	Interpret and Communicate	Select appropriate predictions based on previously observed patterns of evidence.	7	creating theories based on observations	13	predict speed of ball
				11	Ptolemy model vs. Copernicus model of the solar system	13	compare prediction to measurement
				40	making a good model	18	how would acceleration be different?
				44	using a graphical model to make a prediction and checking the model's accuracy	22	how do you measured positions compare to model?
				297	frequency spectrum	22	compare calculation with graph estimate
				498	since wood is created from other matter it must not be a fundamental substance	29	does experiment agree with prediction?
						33	calculate the predicted speed
						37	use your graph to make a prediction
						38	use your graph to make a prediction
						42	predict exact landing location
		43	how does the measurement compare to your prediction?				
		65	predict where the ball moves fastest				
		76	compare predicted mass to actual mass				
		114	are there differences between your prediction and measurement?				

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**Student Text and Investigation Manual**

Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
					132 predict what the current will be
Ph.INQ.4.2 Physics	Process Standard	Interpret and Communicate	Report data in an appropriate manner.	<p>data tables and graphs can be created on computer or graphing calculator</p> <p>142 finding x and y components of velocity for model rocket</p>	<p>15 record data in a table</p> <p>17 use a data table</p> <p>18 record data</p> <p>21 record results in table</p> <p>27 record position and time data</p> <p>29 record mass and force</p> <p>66 record data in table</p> <p>70 record data in table</p> <p>82 create data table for self-designed experiment</p> <p>82 record your data in table</p>

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
Ph.INQ.4.3 Physics	Process Standard	Interpret and Communicate	Interpret data tables, line, bar, trend, and/or circle graphs.	24	making graphs of experimental results over time	22	uniform acceleration model
				43	constructing a graph	25	create an algebraic model
				43	graphs are a way of representing data	28	solve second law equation for string tension
				44	using a graph to make predictions	32	develop a model that predicts acceleration
				45	recognizing relationships between variables from graphs	43	create four graphs
				45	recognizing patterns using graphs	43	create algebraic model
				45	recognizing patterns using graphs	49	write a formula
				54	understanding patterns in relationships between variables	94	give an equation that describes your observations
				56	indicate relationships between variables in graphs	189	Bernoulli's equation
				60	creating the acceleration formula from experiments		
				66	developing the formulas for a model of motion with constant acceleration		
				246	understanding graphs of harmonic motion		
				246	understanding graphs of harmonic motion		
				282	write a formula relating velocity of wave to period and wavelength		

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
				304 comparison of wave forms from guitar sounds 307 decibel level vs. frequency graph for human hearing 312 light intensity follows an inverse square law 427 diagramming electric fields using field lines 443 diagramming magnetic fields using magnetic field lines 479 current vs.voltage graph for a transistor	
Ph.INQ.4.4 Physics	Process Standard	Interpret and Communicate	Accept or reject hypotheses when given results of a physics investigation.	8 testing hypotheses with experiments 188 perpetual motion machines	12 do your results agree with hypothesis? 33 does your experiment confirm your hypothesis? 50 does your experiment provide confirmation? 66 does this agree with your hypothesis?

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
Ph.INQ.4.5 Physics	Process Standard	Interpret and Communicate	Evaluate experimental data to draw the most logical conclusion.	306 explain why hearing can be damaged by loud sounds	16 what do the results tell you? 18 are the accelerations different? 19 does the ball accelerate? 43 what would happen if...? 58 explain why the angular acceleration is different 80 explain your observations 87 explain how force applied causes the response 90 explain why higher tension makes waves move faster 92 explain how wind might cause big waves in water 109 explain how the colored filters work 132 what conclusions can you draw? 133 analyze data and explain a rule
Ph.INQ.4.6 Physics	Process Standard	Interpret and Communicate	Prepare a written report describing the sequence, results, and interpretation of a physics investigation or event.	42 writing procedures in a lab notebook helps make sure your results are repeatable	122 communicate your findings 175 display information you found for your element 202 keep detailed notes as you work

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
Ph.INQ.4.7 Physics	Process Standard	Interpret and Communicate	Communicate or defend scientific thinking that resulted in conclusions.	7	revising explanations through observation	12	was this experiment better or worse than the first?
				8	refining theories based on observations	16	what do the results tell you?
				11	acceptance of the Copernican model of the solar system on the basis of scientific evidence	18	are the accelerations different?
				44	checking a graphical model's accuracy	19	does the ball accelerate?
				103	evaluating perpetual motion claims	43	what would happen if...?
				306	explain why hearing can be damaged by loud sounds	58	explain why the angular acceleration is different
						80	explain your observations
						87	explain how force applied causes the response
						90	explain why higher tension makes waves move faster
						92	explain how wind might cause big waves in water
						97	reliability of a double-blind test
						97	did the method give an accurate result?
						109	explain how the colored filters work
		132	what conclusions can you draw?				
		133	analyze data and explain a rule				

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page		Volume Two Investigation Manual Page	
Ph.INQ.4.8 Physics	Process Standard	Interpret and Communicate	Identify and/or create an appropriate graph or chart from collected data, tables, or written description.	43	constructing a graph	13	create a graph
				44	graphical models	16	create a graph
				54	constructing a graph	16	describe the graph
				55	create a graph from a data table	22	create graphs
						37	make a graph
				290	the process of digital sound reproduction	38	make a graph
				411	the waveform of AC electricity	43	sketch four graphs
						56	create a graph
						66	create a graph of speed vs. position
						82	make three different graphs
						87	sketch a graph
						135	graph voltage vs. current
						136	graph voltage vs. current
		151	make a graph of voltage vs. time				
		160	create a graph				
		167	make a graph of voltage vs. number of magnets				
		169	make a current vs. voltage graph for the diode				

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page		Volume Two Investigation Manual Page	
Ph.INQ.5.1 Physics	Process Standard	Model	Interpret a model which explains a given set of observations.	7	developing models to explain observations	22	model for uniform accelerated motion
				40	creating useful models	22	uniform acceleration model
				60	creating the acceleration formula from experiments	25	create an algebraic model
				66	developing the formulas for a model of motion with constant acceleration	28	solve second law equation for string tension
				101	a model for friction	32	develop a model that predicts acceleration
				102	a model for static friction	43	create algebraic model
				282	write a formula relating velocity of wave to period and wavelength	49	write a formula
				312	light intensity follows an inverse square law	94	give an equation that describes your observations
				330	optics and optical instruments	189	Bernoulli's equation
				492	the binary number system and its use in computers		

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
Ph.INQ.5.2 Physics	Process Standard	Model	Select predictions based on models.	7 498	<p>creating theories based on observations</p> <p>since wood is created from other matter it must not be a fundamental substance</p> <p>13 predict speed of ball</p> <p>18 how would acceleration be different?</p> <p>33 calculate the predicted speed</p> <p>37 use your graph to make a prediction</p> <p>38 use your graph to make a prediction</p> <p>42 predict exact landing location</p> <p>65 predict where the ball moves fastest</p> <p>132 predict what the current will be</p>
Ph.INQ.5.3 Physics	Process Standard	Model	Compare a given model to the physical world.	7 40 101 102 330 492	<p>developing models to explain observations</p> <p>creating useful models</p> <p>a model for friction</p> <p>a model for static friction</p> <p>optics and optical instruments</p> <p>the binary number system and its use in computers</p> <p>22 model for uniform accelerated motion</p>

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
Ph.INQ.6.1 Physics	Process Standard	Inquiry	Formulate a testable hypothesis and design an appropriate experiment relating to the physical world.	8 formulating a hypothesis	11 formulate a testable hypothesis 33 formulate a testable hypothesis 48 formulate a hypothesis 65 form a hypothesis 79 write a hypothesis
Ph.INQ.6.2 Physics	Process Standard	Inquiry	Design and conduct physics investigations in which variables are identified and controlled.	40 defining variables 42 control and experimental variables 43 dependent and independent variables in graphs 54 importance of changing one variable at a time in an experiment 251 changing the natural frequency of a stretched rubber band	11 recognizing and controlling variables 28 set up the ultimate pulley 67 set up the straight track 82 determine which variable has the greatest effect 82 dependent and independent variables 85 design and test a way to increase natural frequency 166 variables that affect the performance of the generator 201 determine the equipment you will need 202 conduct your experiment

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
Ph.INQ.6.3 Physics	Process Standard	Inquiry	Use a variety of technologies, such as hand tools, measuring instruments, and computers to collect, analyze, and display data.	<p>data tables and graphs can be created on computer or graphing calculator</p> <p>18 measuring distance</p> <p>25 accuracy and precision of measurements</p>	<p>1 estimating length</p> <p>6 collecting data with precision</p> <p>6 accuracy and resolution and printing</p> <p>15 collect time data with precision</p> <p>18 collect time data with precision</p> <p>43 measure and record the distance</p> <p>60 measure input and output forces</p> <p>67 measure vertical distance</p> <p>82 measure the length of the string</p>

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
Ph.INQ.6.4 Physics	Process Standard	Inquiry	Inquiries should lead to the formulation of explanations or models (physical, conceptual, and mathematical).	7	developing models to explain observations	13	compare prediction to measurement
				7	revising explanations through observation	13	create a graph
				8	refining theories based on observations	16	describe the graph
				10	the usefulness of phlogiston theory despite being incorrect	16	create a graph
				11	Ptolemy model vs. Copernicus model of the solar system	22	create graphs
				40	creating useful models	22	model for uniform accelerated motion
				40	making a good model	22	compare calculation with graph estimate
				43	constructing a graph	22	how do you measured positions compare to model?
				44	using a graphical model to make a prediction and checking the model's accuracy	22	uniform acceleration model
				44	graphical models	25	create an algebraic model
				54	constructing a graph	28	solve second law equation for string tension
				55	create a graph from a data table	29	does experiment agree with prediction?
				60	creating the acceleration formula from experiments	32	develop a model that predicts acceleration
				66	developing the formulas for a model of motion with constant acceleration	37	make a graph
				71	parachutes and air resistance	38	make a graph
						43	sketch four graphs
						43	create algebraic model
		43	perform experiment				

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Standard #: Science Courses	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page		
				101	a model for friction	43	how does the measurement compare to your prediction?
				102	a model for static friction		
				242	finding a basic cycle of harmonic motion	49	write a formula
				282	write a formula relating velocity of wave to period and wavelength	56	create a graph
				290	the process of digital sound reproduction	65	investigate motion on a roller coaster
				297	frequency spectrum	66	create a graph of speed vs. position
				312	light intensity follows an inverse square law	67	investigate motion on a roller coaster
				330	optics and optical instruments	76	compare predicted mass to actual mass
				411	the waveform of AC electricity	82	make three different graphs
				456	an experiment with a wire and compass	87	sketch a graph
				463	building an electromagnet with wire and a nail	94	give an equation that describes your observations
				467	experiment demonstrating electromagnetic induction	114	are there differences between your prediction and measurement?
				492	the binary number system and its use in computers	135	graph voltage vs. current
						136	graph voltage vs. current
						151	make a graph of voltage vs. time
						160	create a graph
						167	make a graph of voltage vs. number of magnets

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Standard #: Science Cours	Standard type	Standard	Objective	Volume One Student Text Page	Volume Two Investigation Manual Page
					169 make a current vs. voltage graph for the diode 189 Bernoulli's equation 204 build models of Na and Cl and use them to explain bonding