

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS01.a	Physical Science	The student will plan and conduct investigations in which:	chemicals and equipment are used safely	500	safety rules described	20	safety tip for car/ramp setup
				501	safety quiz	24	ropes and pulley safety
						26	safety tip for hanging weights from lever
						40	electrical safety
						44	short circuit safety warning
						56	short circuit safety warning
						58	short circuit safety warning
						146	safety in the lab
						150	chemistry safety
						158	wear goggles and apron
						164	safety equipment
						168	hot water safety
						172	safety tip for water testing
						180	thermometer safety
						182	heat safety
						186	thermometer safety
						192	heat safety
						198	heat safety
						200	safely using rubber bands

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS01.b	Physical Science	The student will plan and conduct investigations in which:	length, mass, volume, density, temperature, weight, and force are accurately measured and reported using the SI system	5	measuring distance	5	measuring metric and english lengths
				5	make measurements with precision	5	making measurements with precision
				6	scientists use metric units	6	measure time
				19	convert from english to metric	7	measure and record variables
				78	use and understand mass measurements	12	make metric length measurement
				280	measuring volume of liquids	16	measure force
				280	measuring volume of solids	16	understand and use units of force
						17	measure the force
						17	measure the force
						25	measure and record the force
						30	measure height difference
						36	make precise height measurements
						44	measure voltage
						46	measure current
						48	measure resistance
						63	making measurements with precision
						75	make precise length measurements
						87	measure wavelength

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
						116 measure mass 116 measuring mass 117 measure volume 117 measuring volume 176 measure pH 180 measure temperature	
PS01.c	Physical Science	The student will plan and conduct investigations in which:	conversions are made among metric units applying appropriate prefixes		featured throughout CPO Science program featured in ancillary component	featured throughout CPO Science program featured in ancillary component	
				18	perform dimensional analysis calculations		
				501	safety quiz		

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS01.d	Physical Science	The student will plan and conduct investigations in which:	triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, and spring scales are used to gather data	24 501	featured throughout CPO Science program using an electronic timer safety quiz	7 12 14 16 17 18 30 44 46 48 50 158	featured throughout CPO Science program use a ruler to make a measurement using photogates using photogates use a force scale use photogates to study car on ramp use a balance to find mass of car use force scale using electrical meter using electrical meter using electrical meter using electrical meter use a thermometer
PS01.e	Physical Science	The student will plan and conduct investigations in which:	numbers are expressed in scientific notation where appropriate		featured in ancillary component		featured in ancillary component

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS01.f	Physical Science	The student will plan and conduct investigations in which:	research skills are utilized using a variety of resources	110	research Franklin's electricity experiments	130	investigate Rutherford's gold foil experiment
				313	development of atomic theory	177	research pH indicators
				324	research and create a poster to illustrate development of atomic model	201	research electricity generation
				370	research Lavoisier's contributions		
				400	research the Clean Air Act of 1970 and 1990		
				434	research local water supply history		
				464	research the history of heat and temperature		

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS01.g	Physical Science	The student will plan and conduct investigations in which:	independent and dependent variables, constants, controls, and repeated trials are identified	11	featured throughout CPO Science program	7	featured throughout CPO Science program
				12	control and experimental variables	7	variables in an experiment
				26	writing lab procedures	7	doing a controlled experiment
				28	independent and dependent variables	7	perform your own experiment
				41	identifying cause and effect relationships	10	conduct car/ramp experiment
				501	identify cause and effect	16	investigate Newton's 2nd law
					safety quiz	21	determine effect of increasing mass
						21	choose independent and dependent variables for graph
						27	recognize variables
						34	investigate motion on a rollercoaster
						75	perform self-designed experiment
						151	write a procedure
						166	write a procedure

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS01.h	Physical Science	The student will plan and conduct investigations in which:	data tables showing the independent and dependent variables, derived quantities, and the number of trials are constructed and interpreted			<p>9 construct a data table</p> <p>12 understand and use data table</p> <p>17 record results in data table</p> <p>18 organize different combinations of data</p> <p>24 use data table to record results</p> <p>27 use data table to record results</p> <p>30 record ropes and pulley data in table</p> <p>36 organize data into a table</p> <p>75 create data table for self-designed experiment</p> <p>151 design a data table</p> <p>167 use data table for observations</p> <p>173 organize water quality data into a table</p>	

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS01.i	Physical Science	The student will plan and conduct investigations in which:	data tables for descriptive statistics showing specific measures of central tendency, the range of data set, and the number of repeated trials are constructed and interpreted			9 construct a data table 12 understand and use data table 17 record results in data table 18 organize different combinations of data 24 use data table to record results 27 use data table to record results 30 record ropes and pulley data in table 36 organize data into a table 75 create data table for self-designed experiment 129 find average velocity 151 design a data table 167 average dissolving rate 167 use data table for observations 173 organize water quality data into a table	

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS01.j	Physical Science	The student will plan and conduct investigations in which:	frequency distributions, scattergrams, line plots, and histograms are constructed and interpreted	24	making a graph	11	draw best fit curve
				26	drawing a best fit curve	11	use your graph to predict speed
				26	creating graphs	13	draw best fit curve
				31	determining slope of a line	13	graph distance vs. time
				38	determining slope of a line	15	calculating acceleration from the slope of the line
				41	make a graph	15	construct a quantitative graphical model
						37	organize data into a graph of speed vs. height
						51	graph voltage vs. current
						121	graph mass vs. volume
						147	organize observations into a category table
						181	construct a graphical model
						183	construct a temperature vs. time graph

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS01.k	Physical Science	The student will plan and conduct investigations in which:	valid conclusions are made after analyzing data	501	featured throughout CPO Science program safety quiz	21 35 45 157	featured throughout CPO Science program construct reasonable explanation based on data study data and determine importance of height on speed of marble analyze data and explain a rule add new rules to list based on findings

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS01.I	Physical Science	The student will plan and conduct investigations in which:	research methods are used to investigate practical problems and questions		featured throughout CPO Science program		featured throughout CPO Science program
				7	experimentation begins with a question	6	formulate hypothesis
				9	steps in the scientific method	6	how do we ask questions and get answers from nature?
				10	forming a hypothesis	7	perform your own experiment
				10	the research question and hypothesis	7	design your own experiment
				19	design your own experiment	7	compare results with hypothesis
				19	design your own experiment	9	design three experiments using car and ramp
				42	devise an experiment	9	devise a hypothesis
				501	safety quiz	10	conduct car/ramp experiment
						16	investigate Newton's 2nd law
						16	decide how to vary the force on the car for this experiment
						26	what variables can be changed?
						34	investigate motion on a rollercoaster
						34	formulate hypothesis
						75	perform self-designed experiment

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
						75	design pendulum experiment
						75	plan three experiments to determine which variable affects the period of a pendulum
						93	decision trees and the advantage of doing multiple trials
						101	how could you extend the investigation to explore materials that give off light when heated?
						117	how could you find the volume of one drop of water?
						151	design experiment to find out if mass is conserved
						166	which factor will produce fastest dissolving rate?
						166	devise hypothesis and explain
						166	what three factors influence dissolving rate?
						178	formulate hypothesis
						198	formulate hypothesis

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS01.m	Physical Science	The student will plan and conduct investigations in which:	experimental results are presented in appropriate written form	501	featured throughout CPO Science program safety quiz	9 173 175 179	featured throughout CPO Science program reporting on an experiment write paragraph to explain results create water quality report write summary of findings
PS01.n	Physical Science	The student will plan and conduct investigations in which:	an understanding of the nature of science is developed and reinforced	23 24 24 501	featured throughout CPO Science program why make models? what is a scientific model? scientific models safety quiz	6	featured throughout CPO Science program asking questions and learning about natural world
PS02.a	Physical Science	The student will investigate and understand the basic nature of matter	the particle theory of matter	311 311 501	featured throughout CPO Science program all matter is formed from atoms all matter is formed from atoms safety quiz	132	featured throughout CPO Science program comparing atoms

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS02.b	Physical Science	The student will investigate and understand the basic nature of matter	elements, compounds, mixtures, acids, bases and salts	278	pure substances cannot be separated by physical means	114	investigating a mixture
				278	mixtures can be separated by physical means	114	separating a homogeneous mixture
				279	summary of matter classification	114	investigate a homogeneous mixture
				283	atoms and molecules	141	compare and contrast elements and compounds
				288	create a poster of matter classification	165	investigate solutions and colloids and suspensions
				437	concentration of ions and pH	176	measure pH
				440	examples of acid and base chemistry	176	investigate acids and bases
				443	pH and blood	176	measure pH of everyday solutions
PS02.c	Physical Science	The student will investigate and understand the basic nature of matter	solids, liquids, and gases	284	states of matter and arrangement of molecules	118	observe melting process and study quantitatively
				284	changes of state	118	molecules in a liquid
				285	characteristics of matter related to its state	118	investigate melting
						118	think of melting process at molecular level
						119	energy and phase changes

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS02.d	Physical Science	The student will investigate and understand the basic nature of matter	characteristics of types of matter based on physical and chemical properties	294	development of Kevlar brand fiber	146	investigate and observe chemical and physical changes in the lab
				353	physical and chemical changes and digestion		
				355	physical and chemical changes in tire recycling		
				372	determine if changes are chemical or physical		

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS02.e	Physical Science	The student will investigate and understand the basic nature of matter	physical properties (shape, density, solubility, odor, melting point, boiling point, color)	281	volume and mass contrasted	116	mass and volume measurements
				284	melting and boiling point explained	119	melting point of ice
				284	melting and boiling points	124	build a density column
				285	table of melting and boiling points	126	investigating buoyancy with clay boats
				291	density explained	128	use CPO viscometer to study viscosity
				291	density is independent of amount of substance		
				292	elasticity is a physical property of matter		
				292	hardness is a physical property of matter		
				293	brittleness is a physical property of matter		
				294	tensile strength is a physical property of matter		
				294	malleability is a physical property of matter		
				295	relationship between mass volume and density		
				296	density of liquid water vs. ice		
				297	buoyancy explained		
				298	sinking and floating		
				302	viscosity of motor oils		

**Correlation to Virginia Public Schools: Science Standards of Learning
 Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
				305	viscosity of glue mixtures		
PS02.f	Physical Science	The student will investigate and understand the basic nature of matter	chemical properties (acidity, basicity, combustibility, reactivity)	357 361	combustion reaction heartburn reaction	176	investigate acids and bases
PS03.a	Physical Science	The student will investigate and understand the modern and historical models of atomic structure	the contributions of Dalton, Thomson, Rutherford and Bohr in understanding the atom	313 324	development of atomic theory research and create a poster to illustrate development of atomic model	130	investigate Rutherford's gold foil experiment
PS03.b	Physical Science	The student will investigate and understand the modern and historical models of atomic structure	the modern model of atomic structure	311 311 315 318 388	location/size/charge of subatomic particles protons/neutrons/electrons atoms of same element have same atomic number proton/electron attraction showing valence electrons in a diagram	132 132 133 133 136 137 137 140 140	atomic number determines what element that atom is building atom models location of electrons in atom protons and neutrons model stable and neutral atoms importance of atomic number build atomic models find the number of electrons in outermost level review subatomic particles

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS04.a	Physical Science	The student will investigate and understand the organization and use of the periodic table of elements to obtain information.	symbols, atomic numbers, atomic mass, chemical families (groups), and periods	315 316 320 321 322 322 322 322	atomic number discussed mass number discussed groups of elements studying the periodic table atomic number on the periodic table mass number on the periodic table chemical symbols and element names atomic mass on the periodic table	133 133 133 133 136 136 136	using the periodic table identify mass number identify element symbol and name identify atomic number building and studying the periodic table atomic number mass number
PS04.b	Physical Science	The student will investigate and understand the organization and use of the periodic table of elements to obtain information.	classification of elements as metals, metalloids, and nonmetals	332	metals nonmetals and metalloids		
PS04.c	Physical Science	The student will investigate and understand how to use the periodic table of elements to obtain information.	simple compounds (formulas and nature of bonding)	324 324 332 335	use the periodic table to predict chemical formulas which element is more likely to combine with other elements? metals nonmetals and metalloids chemical bonding and the periodic table	141	modeling a chemical bond

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS05.a	Physical Science	The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy	physical changes	284	changes of state	119	energy and phase changes
PS05.b	Physical Science	The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy	nuclear reactions (products of fusion and fission and their effects on human beings and the environment)	387 388 393 393 400	fusion and fission explained nuclear vs chemical reactions radioisotopes in science and medicine carbon dating research pros and cons of nuclear technology	138 138 160 160 161	fusion and fission nuclear reactions radioactive decay how do you simulate nuclear decay? research pros and cons of uses for radioactive elements

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 Foundations of Physical Science Student Text and Investigation Manual**

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PS05.c	Physical Science	The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy	chemical changes (types of reactions, reactants and products, and balanced equations)	336	writing chemical formulas	148	reactants and products
				354	new substances are formed when a chemical change occurs	149	balance these equations
				357	chemical reactions involve rearrangement of atoms	149	practice balancing equations
				359	balancing chemical equations	152	predict how much product formed given the reactants
				361	chemical reactions in living systems	152	write the balanced equation
				363	history of law of conservation of mass	155	calculating product yield
				368	predicting amount of product	156	investigate double displacement reactions
				371	which of the equations is balanced?	157	predict the products of double displacement reactions
				375	synthesis or addition reactions	158	investigate energy changes in chemical reactions
				376	decomposition reactions	162	investigating combustion reactions
				377	single displacement reactions		
				377	double displacement reactions		
				378	combustion reactions		
				378	consumer chemistry		
				381	exothermic reactions and MREs		

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
				381	MRE ration heater reaction		
				382	endothermic reactions and cold packs		
				395	chemistry of the atmosphere		
				395	chemistry of the atmosphere		
				397	carbon reactions		
				444	chemical reactions and the formation of acid rain		
				487	chemical reactions in living systems		
PS06.a	Physical Science	The student will investigate and understand states and forms of energy and how energy is transferred and transformed	potential and kinetic energy	91	following an energy transformation	38	identify potential/kinetic energy conversions
PS06.b	Physical Science	The student will investigate and understand states and forms of energy and how energy is transferred and transformed	mechanical, chemical, and electrical energy	91	following an energy transformation	39	make an energy flow chart

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Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS06.c	Physical Science	The student will investigate and understand states and forms of energy and how energy is transferred and transformed	heat, light, and sound	91	understand basic forms of energy	39	identify type of energy involved
PS07.a	Physical Science	The student will investigate and understand temperature scales, heat, and heat transfer	Celsius and Kelvin temp. scales and absolute zero	452 455	temperature scales temperature and thermal energy and heat	119 182	investigate temperature and energy transfer in melting process relationship between heat and temperature
PS07.b	Physical Science	The student will investigate and understand temperature scales, heat, and heat transfer	phase change, freezing point, boiling point, vaporization, and condensation	284 284 285	melting and boiling points melting and boiling point explained table of melting and boiling points	119 119	melting point of ice create a temperature vs. time graph of phase change

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS07.c	Physical Science	The student will investigate and understand temperature scales, heat, and heat transfer	conduction, convection, and radiation	468	densely packed solids are good conductors of heat	190	investigate conduction through all states of matter
				468	heat transfer through air	192	investigate convection in liquids
				470	warming hands over candle	194	investigate radiation emitted by liquids
				470	convection currents and weather	194	investigate radiation emitted by solids
				472	convection currents in water		
				476	solid road surface emits radiation		
				478	apply knowledge of heat transfer to different situations		
				481	global warming and heat transfer by radiation		
PS07.d	Physical Science	The student will investigate and understand temperature scales, heat, and heat transfer	applications of heat transfer (heat engines, thermostats, refrigeration and heat pumps)	481	global warming		
				488	cooling processes and the human body		
				488	cooling processes and the human body		
				491	heat generated in mechanical systems		
				493	using heat to do mechanical work		
				494	cooling processes and mechanical systems		
				494	cooling processes and mechanical systems		

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS08.a	Physical Science	The student will investigate and understand characteristics of sound and technological applications of sound waves	wavelength, frequency, speed and amplitude	179 182 182 192 221	what is a cycle? concept of frequency explained concept of period explained analyze systems to find cycle/period/frequency importance of wavelength of sound waves	83 86	find speed of a wave adjust frequency of a standing wave
PS08.b	Physical Science	The student will investigate and understand characteristics of sound and technological applications of sound waves	resonance	204 210	resonance explained natural frequency of a building and earthquakes	87 88 96	investigating resonance natural frequency and resonance of standing waves on a string investigating sound resonance
PS08.c	Physical Science	The student will investigate and understand characteristics of sound and technological applications of sound waves	the nature of mechanical waves	198 215 242 474	frequency and wavelength and amplitude properties of sound waves properties of light waves electromagnetic radiation	83 86	measure speed of a wave pulse investigate frequency and wavelength
PS08.d	Physical Science	The student will investigate and understand characteristics of sound and technological applications of sound waves	technological applications of sound	220 220 220 226	sonograms white noise voice recognition programs musical instruments	90 98	investigate human perception of sound investigate sound and music

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS09.a	Physical Science	The student will investigate and understand the nature and technological applications of light	the wave behavior of light (reflection, refraction, diffraction, and interference)	258	refraction in optical systems	106	tracing incident and reflected rays
				258	forming images with lenses	107	investigate how light interacts with mirrors
				260	reflection and mirrors	107	plot reflected rays from a mirror
				263	index of refraction	107	investigate reflection of light
				263	index of refraction	108	tracing incident and refracted rays
				273	find the angle of reflection	108	investigate how light interacts with a prism
				476	absorption and emission	108	explore refraction with lenses
						110	finding focal point and focal length of a lens
						111	plotting images formed when light is refracted by a lens

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS09.b	Physical Science	The student will investigate and understand the nature and technological applications of light	images formed by lenses and mirrors	258	forming images with lenses	107 108 108 110 111	investigate how light interacts with mirrors investigate how light interacts with a prism explore refraction with lenses finding focal point and focal length of a lens plotting images formed when light is refracted by a lens
PS09.c	Physical Science	The student will investigate and understand the nature and technological applications of light	electromagnetic spectrum	196 237 237 237 250 272	waves are all around us radio and television signals microwave ovens visible light and the electromagnetic spectrum identify uses of electromagnetic waves identify uses of electromagnetic waves	134	investigating visible light with a spectrometer

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

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PS10.a	Physical Science	The student will investigate and understand scientific principles and technological applications of work, force, and motion	speed, velocity, and acceleration	14	how to calculate speed	8	calculating speed
				15	compare and contrast speed and velocity	9	collect data and calculate speed of car
				20	find speed of bumblebee	10	calculate speed of the car
				20	calculate speed of car	12	calculate speed of moving car
				24	accurate speed measurements	12	find speed of car at different positions
				30	position vs. time graphs	13	make a position vs. time graph
				32	average speed vs. instantaneous	14	calculate acceleration of car on ramp
				32	average speed discussed	14	acceleration is the rate at which speed changes
				33	understanding acceleration	14	calculate speed of car at two places on the ramp
				35	how to calculate acceleration	15	make a speed vs. time graph
				36	examples of acceleration	17	explore 2nd law and acceleration
				37	speed vs. time graphs	17	calculate speed of car
				41	find acceleration of car	36	find speed of marble
				42	calculate speed from distance/time graph		
				49	link between force and acceleration		
				53	acceleration due to gravity		

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS10.b	Physical Science	The student will investigate and understand scientific principles and technological applications of work, force, and motion	Newton's laws of motion	45	Newton's third law summarized	14	exploring acceleration on a ramp
				45	Newton's second law summarized	16	2nd law
				45	Newton's first law summarized	16	unbalanced forces and acceleration of car
				46	force has potential to change motion	16	thinking about force
				48	Newton's first law in detail	19	discover 2nd law of motion
				49	force is related to acceleration	19	find correct relationship between force mass and acceleration
				49	Newton's second law in detail	20	force and motion with car and ramp
				51	balanced and unbalanced forces	22	car and ramp and Newton's 3rd law
				59	Newton's third law in detail	23	using 3rd law to explain common phenomena
64	solving problems using $f=ma$						

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Foundations of Physical Science Student Text and Investigation Manual**

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PS10.c	Physical Science	The student will investigate and understand scientific principles and technological applications of work, force, and motion	work, force, mechanical advantage, efficiency and power	46	force has potential to change motion	19	find correct relationship between force mass and acceleration
				49	force is related to acceleration	24	measure force in newtons
				68	compound machines	29	design and construct complex gear machines
				69	newtons and pounds	31	calculate work done on block
				83	how to calculate work	31	work = force X distance
				85	efficiency explained	31	work = force X distance
				85	efficiency and bicycles	185	find efficiency of water heater
				86	how to calculate power		
				86	power explained		
				87	concept of energy as stored work		
				96	decide whether or not work is done		
				96	calculate work done		
				97	calculate work output from efficiency data		
				97	analyze power of motor		
				97	calculate power of two different machines		
				97	calculate power		
				97	find the efficiency of a machine		
				97	calculate work accomplished by a motor		

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
				97	compare different amounts of work done		
				138	how to calculate electrical power		
				488	work vs. calories used by the body		
				488	work vs. calories used by the body		
				491	work and mechanical systems		

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS10.d	Physical Science	The student will investigate and understand scientific principles and technological applications of work, force, and motion	applications (simple machines, compound machines, powered vehicles, rockets and restraining devices	67	how simple machines manipulate forces	25	discover mechanical advantage of ropes and pulleys
				69	how to calculate mechanical advantage	27	changing force and distance on a lever
				70	mechanical advantage of block and tackle	27	set up a lever that has mechanical advantage
				71	parts of a lever		
				71	how a lever works	30	exploring force and distance with ropes and pulleys
				71	the human body and simple machines		
				71	pliers as an example of a lever	31	work output vs. work input
				72	mechanical advantage of a lever		
				75	how gears work		
				78	design a toothbrush		
				78	set up a lever with MA greater than 1		
				79	calculate mechanical advantage		
				79	analyze block and tackle		
				79	analyze pulleys with different numbers of supporting strings		
				80	analyze wheelbarrow		
				80	analyzing the jaw as a lever		

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
				80	analyze block and tackle machine on a sailboat		
				84	work input and output		

**Correlation to Virginia Public Schools: Science Standards of Learning
Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS11.a	Physical Science	The student will investigate and understand basic principles of electricity and magnetism	static, current, circuits	101	concept of electric current	42	investigate electric charge
				102	concept of electric circuits	44	investigate concept of voltage
				103	circuit diagrams	45	battery chemicals and electrical charge
				105	charge is a fundamental property of matter	46	investigate concept of electric current
				106	static charge discussed	48	measuring resistance
				107	explanation of coulomb	50	Ohm's law
				108	how an electroscope works	56	build a parallel circuit
				108	electroscopes	56	build a series circuit
				113	battery uses chemical energy to produce electrical charge	57	compare brightness of bulbs in series vs. parallel
				114	voltage and potential energy	58	build a series circuit and find total resistance
				115	how to measure voltage	60	parallel circuit and Ohm's law
				117	electrical current explained	61	compare current and voltage and resistance in each type of circuit
				119	how to measure current		
				123	understand the concept of electrical resistance		
				131	Ohm's law explained		
				132	using Ohm's law to analyze circuits		
				136	potentiometer explained		
				145	holiday lights as series or parallel		

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Foundations of Physical Science Student Text and Investigation Manual**

Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
				145	single path vs. branching paths		
				145	parallel circuit defined		
				145	series circuit defined		
				146	household wiring		
				147	current and voltage in series circuits		
				151	voltage and resistance in parallel circuits		
				155	analyze a parallel circuit		
				156	analyze a series circuit		
PS11.b	Physical Science	The student will investigate and understand basic principles of electricity and magnetism	magnetic fields and electromagnets	159	magnetism explained	62	describing forces that magnets exert on each other
				163	understanding magnetic fields	64	testing materials to see if they are affected by magnets
				164	what is an electromagnet?	66	compare electromagnets and permanent magnets
				166	increased current vs. strength of magnetic field	66	build an electromagnet
				166	building an electromagnet	67	find out what happens to strength of electromagnet when current is increased
				171	electromagnetic induction explained	73	use magnetic induction to create an electric field
						73	exploring electric generators

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Standard #:	Subject	Standard	Key Concept	student text pg	detail	investigation pg	detail
PS11.c	Physical Science	The student will investigate and understand basic principles of electricity and magnetism	motors and generators	168 170	how electric motors work dissecting an electric motor	68	investigate how an electric motor works