

**Correlation to New York Learning Standards for Math, Science, and Technology**  
**Foundations of Physical Science Student Text and Investigation Manual**

Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
1SIC1.1 Analysis, Inquiry, and Design/ Scientific Inquiry	Intermediate	The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.	elaborate on basic scientific and personal explanations of natural phenomena, and develop extended visual models and mathematical formulations to represent their thinking.	23 24 24 24 26 41 42	why make models? scientific models what is a scientific model? making a graph creating graphs make a graph interpreting distance/time graph	6 13 15 21 25 27 28 35 37 45 51 121 147 151 163	asking questions and learning about natural world graph distance vs. time construct a quantitative graphical model construct reasonable explanation based on data create a mathematical model find math rule for lever equilibrium derive a math formula study data and determine importance of height on speed of marble organize data into a graph of speed vs. height analyze data and explain a rule graph voltage vs. current graph mass vs. volume organize observations into a category table does your experiment agree with law of conservation of mass? evaluating choice of favorite car

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						181	construct a graphical model
						183	construct a temperature vs. time graph
1SIC1.2 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.	hone ideas through reasoning, library research, and discussion with others, including experts.	313	development of atomic theory	21	think about percent change
				324	research and create a poster to illustrate development of atomic model	21	construct reasonable explanation based on data
				400	research the Clean Air Act of 1970 and 1990	35	study data and determine importance of height on speed of marble
				434	research local water supply history	45	analyze data and explain a rule
				464	research the history of heat and temperature	130	investigate Rutherford's gold foil experiment
						163	evaluating choice of favorite car
						177	research pH indicators
						201	research electricity generation

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1SIC1.3 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.	work toward reconciling competing explanations; clarifying points of agreement and disagreement.	20	explain your reasoning	9 15 19 29 37 39 47 47 129 145 151 157	present conclusions to the class discuss and test ideas with your group explain how you arrived at your answer discuss what you learned about gears describe the flow of energy based on experimental graph give a brief presentation to the class discuss an explanation with your group present and defend an explanation explain your answer and justify present findings and methods used present results to the class add new rules to list based on findings

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
1SIC1.4 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.	coordinate explanations at different levels of scale, points of focus, and degrees of complexity and specificity and recognize the need for such alternative representations of the natural world.	6	scientists use metric units	4	dimensional diagrams
				19	convert from english to metric	12	make metric length measurement
				24	interpretations of patterns in data	15	interpret a speed vs. time graph
				27	reading a graph	70	designing and testing different electric motors
				74	sample engineering problem	70	proposing and comparing different electric motor designs
				78	use and understand mass measurements		
				78	analyze lever diagram	116	measuring mass

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1SIC2.1 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.	devise ways of making observations to test proposed explanations.	7 11 19 26 42	experimentation begins with a question control and experimental variables design your own experiment independent and dependent variables devise an experiment	6 7 7 7 9 16 21 26 27 27 34 43 75 75	predict which car will move fastest design your own experiment doing a controlled experiment test the effect of one other variable design three experiments using car and ramp decide how to vary the force on the car for this experiment choose independent and dependent variables for graph what variables can be changed? recognize variables think about the variables where does the marble move the fastest? how did A and B tapes acquire different charge? design pendulum experiment investigate variables that affect the period of a pendulum

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
						93	decision trees and the advantage of doing multiple trials
						151	perform the experiment you designed
						151	explain how hypothesis compares to results
						151	design experiment to find out if mass is conserved
						166	what three factors influence dissolving rate?

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1SIC2.2 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.	refine their research ideas through library investigations, including electronic information retrieval and reviews of the literature, and through peer feedback obtained from review and discussion.	20 20 79	explain your reasoning finding variability in data look at force data and decide the usefulness of a machine	7 9 10 15 16 18 19 19 29 30 34 37 39	perform your own experiment present conclusions to the class conduct car/ramp experiment discuss and test ideas with your group investigate Newton's 2nd law use data to describe relationship between force and motion use data to infer correct relationship between variables explain how you arrived at your answer discuss what you learned about gears interpret block and tackle data investigate motion on a rollercoaster describe the flow of energy based on experimental graph give a brief presentation to the class

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						47	present and defend an explanation
						47	discuss an explanation with your group
						75	perform self-designed experiment
						129	explain your answer and justify
						141	build models of Na and Cl and use them to explain bonding
						145	present findings to the class
						145	present findings and methods used
						151	present results to the class

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
1SIC2.3 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.	develop and present proposals including formal hypotheses to test their explanations, i.e., they predict what should be observed under specified conditions if the explanation is true.	7 9 10 19 19 42 288	experimentation begins with a question steps in the scientific method forming a hypothesis design your own experiment design your own experiment devise an experiment find the thickness of a single card	6 7 7 9 9 9 9 9 16 26 34 75 75 93 145	formulate hypothesis design your own experiment compare results with hypothesis design three experiments and choose technology devise a hypothesis design three experiments using car and ramp design three experiments and choose equipment decide how to vary the force on the car for this experiment what variables can be changed? formulate hypothesis design pendulum experiment plan three experiments to determine which variable affects the period of a pendulum decision trees and the advantage of doing multiple trials plan a procedure and select necessary equipment

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
						151 design experiment to find out if mass is conserved	
						151 plan procedures and select materials	
						166 what three factors influence dissolving rate?	
						166 which factor will produce fastest dissolving rate?	
						166 devise hypothesis and explain	
						178 formulate hypothesis	
						198 formulate hypothesis	

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1SIC2.4 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.	carry out their research plan for testing explanations, including selecting and developing techniques, acquiring and building apparatus and recording observations as necessary.	12	writing lab procedures	7 9 10 10 12 16 30 34 40 75 145 151 151 166 174	perform your own experiment conduct three experiments with appropriate equipment selecting ramp and photogates conduct car/ramp experiment select equipment and set up experiment investigate Newton's 2nd law rigging block and tackle investigate motion on a rollercoaster choose circuit parts to light a bulb perform self-designed experiment carry out procedure and select equipment write a procedure select materials from list write a procedure visit local water supply and perform testing

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1SII1.1 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.	formulate questions independently with the aid of references appropriate for guiding the search for explanations of everyday observations.	7 10 19 20 42 79	experimentation begins with a question the research question and hypothesis design your own experiment finding variability in data devise an experiment look at force data and decide the usefulness of a machine	6 7 9 16 18 19 26 30 75 93 141 151	how do we ask questions and get answers from nature? design your own experiment design three experiments using car and ramp decide how to vary the force on the car for this experiment use data to describe relationship between force and motion use data to infer correct relationship between variables what variables can be changed? interpret block and tackle data design pendulum experiment decision trees and the advantage of doing multiple trials build models of Na and Cl and use them to explain bonding design experiment to find out if mass is conserved

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
						166	what three factors influence dissolving rate?
1SII1.2 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.	construct explanations independently for natural phenomena, especially by proposing preliminary visual models of phenomena.			6  21  35  45	asking questions and learning about natural world  construct reasonable explanation based on data  study data and determine importance of height on speed of marble  analyze data and explain a rule
1SII1.3 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.	represent, present, and defend their proposed explanations of everyday observations so that they can be understood and assessed by others.			145  173  175  179	present findings to the class  write paragraph to explain results  create water quality report  write summary of findings

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1SII1.4 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.	seek to clarify, to assess critically, and to reconcile with their own thinking the ideas presented by others, including peers, teachers, authors, and scientists.	10	process of reviewing hypothesis explained	35 39 39 39 77 77 151 167	what evidence is there in support of your hypothesis? critique group's explanation of energy transformations review energy theory in context of everyday scenarios analyze energy transformations in different scenarios show how energy loss data could be applied to designing a real clock compare law of conservation of energy to motion of pendulum review your hypothesis did you prove or disprove your hypothesis?

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1SII.2.1 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.	use conventional techniques and those of their own design to make further observations and refine their explanations, guided by a need for more information.			6 7 21 27 34 35 43 45 75 101 117 151	predict which car will move fastest test the effect of one other variable construct reasonable explanation based on data think about the variables where does the marble move the fastest? study data and determine importance of height on speed of marble how did A and B tapes acquire different charge? analyze data and explain a rule investigate variables that affect the period of a pendulum how could you extend the investigation to explore materials that give off light when heated? how could you find the volume of one drop of water? does your experiment agree with law of conservation of mass?

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						151	explain how hypothesis compares to results
						151	perform the experiment you designed
						157	add new rules to list based on findings

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
1SII.2 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.	develop, present, and defend formal research proposals for testing their own explanations of common phenomena, including ways of obtaining needed observations and ways of conducting simple controlled experiments.	5 7 11 12 19 26 28 41 42 288	measuring distance experimentation begins with a question control and experimental variables importance of reliable and accurate data collection design your own experiment independent and dependent variables identifying cause and effect relationships identify cause and effect devise an experiment find the thickness of a single card	4 5 6 6 6 7 7 7 7 9 9 9 14 16 16	difference between precise and accurate data measuring metric and english lengths predict which car will move fastest measure time electronic timer and release technique doing a controlled experiment record time interval test the effect of one other variable design your own experiment design three experiments and choose equipment design three experiments using car and ramp collect speed data design three experiments and choose technology record three different time intervals decide how to vary the force on the car for this experiment measure force

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						17	record times
						21	choose independent and dependent variables for graph
						21	determine effect of increasing mass
						24	collect weight data
						25	collect force data
						26	what variables can be changed?
						27	write down the number of weights you use
						27	think about the variables
						27	recognize variables
						34	where does the marble move the fastest?
						36	collect precise speed and height data
						43	how did A and B tapes acquire different charge?
						44	measure voltage
						46	measure current
						48	measure resistance
						75	design pendulum experiment
						75	collect mass and amplitude data

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						75	investigate variables that affect the period of a pendulum
						87	measure wavelength
						93	decision trees and the advantage of doing multiple trials
						116	measure mass
						117	measure volume
						145	plan a procedure and select necessary equipment
						146	record detailed observations
						150	record data as you perform experiment
						151	design experiment to find out if mass is conserved
						151	plan procedures and select materials
						151	explain how hypothesis compares to results
						151	perform the experiment you designed
						166	what three factors influence dissolving rate?
						167	collect time data and record observations
						180	measure temperature

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1SII.2.3 Analysis, Inquiry, and Design/Scientific Inquiry	Intermediate	Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.	carry out their research proposals, recording observations and measurements (e.g., lab notes, audio tape, computer disk, video tape) to help assess the explanation.	5 12	measuring distance importance of reliable and accurate data collection	4 5 6 6 7 7 9 9 9 10 10 12 12 14 16 16	difference between precise and accurate data measuring metric and english lengths electronic timer and release technique measure time record time interval perform your own experiment collect speed data conduct three experiments with appropriate equipment construct a data table selecting ramp and photogates conduct car/ramp experiment select equipment and set up experiment understand and use data table record three different time intervals investigate Newton's 2nd law measure force

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						17	record results in data table
						17	record times
						18	organize different combinations of data
						24	use data table to record results
						24	collect weight data
						25	collect force data
						27	write down the number of weights you use
						27	use data table to record results
						30	record ropes and pulley data in table
						30	rigging block and tackle
						34	investigate motion on a rollercoaster
						36	collect precise speed and height data
						36	organize data into a table
						40	choose circuit parts to light a bulb
						44	measure voltage
						46	measure current
						48	measure resistance

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						75	perform self-designed experiment
						75	collect mass and amplitude data
						75	create data table for self-designed experiment
						87	measure wavelength
						116	measure mass
						117	measure volume
						145	carry out procedure and select equipment
						146	record detailed observations
						150	record data as you perform experiment
						151	design a data table
						151	select materials from list
						167	collect time data and record observations
						167	use data table for observations
						173	organize water quality data into a table
						174	visit local water supply and perform testing
						180	measure temperature

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4PSC3.1 Science/Physical Setting	Commencement	Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.	explain the properties of materials in terms of the arrangement and properties of the atoms that compose them.	279	summary of matter classification	114	investigate a homogeneous mixture
				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
				288	create a poster of matter classification	118	think of melting process at molecular level
				291	density is independent of amount of substance	119	energy and phase changes
				292	hardness is a physical property of matter	132	comparing atoms
				292	elasticity is a physical property of matter	132	building atom models
				292	elasticity is a physical property of matter	133	location of electrons in atom
				293	brittleness is a physical property of matter	133	protons and neutrons
				294	malleability is a physical property of matter	136	model stable and neutral atoms
				294	tensile strength is a physical property of matter	137	importance of atomic number
				311	location/size/charge of subatomic particles	137	build atomic models
				311	all matter is formed from atoms	140	review subatomic particles
				311	protons/neutrons/electrons	165	investigate solutions and colloids and suspensions
311	all matter is formed from atoms						

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				315	atoms of same element have same atomic number		
				318	proton/electron attraction		

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4PSC3.2 Science/Physical Setting	Commencement	Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.	use atomic and molecular models to explain common chemical reactions.	278	compounds are composed of elements	136	ions
				321	groups of elements and valence shells	140	who do atoms form chemical bonds?
				324	which element is more likely to combine with other elements?	140	find the number of electrons in outermost level
				324	use the periodic table to predict chemical formulas	141	modeling a chemical bond
				329	periodic table columns and valence electrons	141	when an atom ionizes
				330	bonding and periodic table position	141	build model of Na and Cl atoms and explain why they bond to form a molecule
				330	ionic bonds	142	arrangement of electrons and groups of elements
				331	covalent bonds	142	who do atoms combine in certain ratios?
				332	periodic table and electronegativities	143	predict chemical formulas
				332	distinguishing between ionic and covalent bonds	143	classify ionic compounds
				335	chemical bonding and the periodic table	144	show ratios in which elements combine to form a compound
				335	periodic table and oxidation numbers	145	determine empirical formula
				336	writing a chemical formula	149	balance these equations
				338	summary of chemical formula writing rules	156	investigate double displacement reactions
				343	mole quantities	157	predict the products of double displacement reactions

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				354	new substances are formed when a chemical change occurs	162	investigating combustion reactions
				357	chemical reactions involve rearrangement of atoms		
				357	combustion reaction		
				361	chemical reactions in living systems		
				361	heartburn reaction		
				371	which of the equations is balanced?		
				375	synthesis or addition reactions		
				376	decomposition reactions		
				377	double displacement reactions		
				377	single displacement reactions		
				378	consumer chemistry		
				378	combustion reactions		
				381	MRE ration heater reaction		
				388	showing valence electrons in a diagram		
				395	chemistry of the atmosphere		
				395	chemistry of the atmosphere		

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				397	carbon reactions		
				444	chemical reactions and the formation of acid rain		
				487	chemical reactions in living systems		
4PSC3.3 Science/Physical Setting	Commencement	Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.	apply the principle of conservation of mass to chemical reactions.	363	history of law of conservation of mass	149	balance these equations
				371	which of the equations is balanced?	150	investigate conservation of mass in effervescent tablet reaction
4PSC3.4 Science/Physical Setting	Commencement	Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.	use kinetic molecular theory to explain rates of reactions and the relationships among temperature, pressure, and volume of a substance.	299	Charles' law	156	predict products in a double displacement reaction
				300	Boyle's law		
				300	what is pressure?		
				364	formation of petroleum is a very slow chemical reaction		

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4PSC4.1 Science/Physical Setting	Commencement	Energy exists in many forms, and when these forms change energy is conserved.	observe and describe transmission of various forms of energy.	91	following an energy transformation	38	identify potential/kinetic energy conversions
				91	following an energy transformation	39	make an energy flow chart
				91	understand basic forms of energy	39	identify type of energy involved
				195	waves transmit energy	134	investigating visible light with a spectrometer
				237	visible light and the electromagnetic spectrum		
				474	ultraviolet and infrared light		
				474	energy and radiation relationships		
4PSC4.2 Science/Physical Setting	Commencement	Energy exists in many forms, and when these forms change energy is conserved.	explain heat in terms of kinetic molecular theory.	451	increasing temperature means increasing motion of molecules	119	adding heat energy to melt an ice cube
4PSC4.3 Science/Physical Setting	Commencement	Energy exists in many forms, and when these forms change energy is conserved.	explain variations in wavelength and frequency in terms of the source of the vibrations that produce them, e.g., molecules, electrons, and nuclear particles.	213	how the ear works	83	find speed of a wave
				217	loudness and decibels	86	adjust frequency of a standing wave
				219	frequency of sound and pitch	90	investigate human perception of sound
				221	importance of wavelength of sound waves	90	what is sound and how do we hear it?
				237	light waves and the electromagnetic spectrum	105	explore relationship between color and wavelength
				242	color and frequency of light waves		

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4PSC4.4 Science/Physical Setting	Commencement	Energy exists in many forms, and when these forms change energy is conserved.	explain the uses and hazards of radioactivity.	387	fusion and fission explained	138	fusion and fission
				388	nuclear vs chemical reactions	138	nuclear reactions
				393	carbon dating	160	radioactive decay
				393	radioisotopes in science and medicine	160	how do you simulate nuclear decay?
				400	research pros and cons of nuclear technology	161	research pros and cons of uses for radioactive elements

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4PSC5.1 Science/Physical Setting	Commencement	Energy and matter interact through forces that result in changes in motion.	explain and predict different patterns of motion of objects (e.g., linear and angular motion, velocity and acceleration, momentum and inertia).	14	how to calculate speed	8	calculating speed
				15	compare and contrast speed and velocity	9	collect data and calculate speed of car
				20	calculate speed of car	10	calculate speed of the car
				20	find speed of bumblebee	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	calculate speed of car at two places on the ramp
				33	understanding acceleration	14	exploring acceleration on a ramp
				35	how to calculate acceleration	14	acceleration is the rate at which speed changes
				36	examples of acceleration	15	make a speed vs. time graph
				37	speed vs. time graphs	16	thinking about force
				41	find acceleration of car	16	2nd law
				42	calculate speed from distance/time graph	16	unbalanced forces and acceleration of car
				45	Newton's third law summarized	17	calculate speed of car
				45	Newton's first law summarized	17	explore 2nd law and acceleration
				45	Newton's second law summarized		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				46	force has potential to change motion	19	find correct relationship between force mass and acceleration
				48	Newton's first law in detail		
				48	Newton's laws explained and applied	19	discover 2nd law of motion
				49	link between force and acceleration	20	force and motion with car and ramp
				49	Newton's second law in detail	20	investigate effect of gravity on motion
				49	force is related to acceleration	21	effect of friction on the car
				50	Newton's second law applied	22	car and ramp and Newton's 3rd law
				51	balanced and unbalanced forces	23	using 3rd law to explain common phenomena
				51	net force explained	36	find speed of marble
				52	the effect of gravity		
				53	acceleration due to gravity		
				56	friction explained		
				59	Newton's third law in detail		
				60	how to calculate momentum		
				60	law of conservation of momentum		
				64	research effect of friction on human joints		

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Standard #: Standard/Topi	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				64	solving problems using $f=ma$		
				64	calculate momentum		
4PSC5.2 Science/Physical Setting	Commencement	Energy and matter interact through forces that result in changes in motion.	explain chemical bonding in terms of the motion of electrons.	324	use the periodic table to predict chemical formulas	140	find the number of electrons in outermost level
				324	which element is more likely to combine with other elements?	141	modeling a chemical bond
				335	chemical bonding and the periodic table	143	ionic compounds
				388	showing valence electrons in a diagram		
4PSC5.3 Science/Physical Setting	Commencement	Energy and matter interact through forces that result in changes in motion.	compare energy relationships within an atom's nucleus to those outside the nucleus.	389	electromagnetic force	136	strong force
				389	strong nuclear force		
				389	forces in the nucleus		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PSI3.1 Science/Physical Setting	Intermediate	Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.	observe and describe properties of materials, such as density, conductivity, and solubility.	281	volume and mass contrasted	116	mass and volume measurements
				291	density explained	124	build a density column
				291	density is independent of amount of substance	126	investigating buoyancy with clay boats
				292	hardness is a physical property of matter	128	use CPO viscometer to study viscosity
				292	elasticity is a physical property of matter		
				293	brittleness is a physical property of matter		
				294	malleability is a physical property of matter		
				294	tensile strength 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		
				305	viscosity of glue mixtures		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PSI3.2 Science/Physical Setting	Intermediate	Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.	distinguish between chemical and physical changes.	284 353 355 357 361 372	changes of state physical and chemical changes and digestion physical and chemical changes in tire recycling combustion reaction heartburn reaction determine if changes are chemical or physical	119 146	energy and phase changes investigate and observe chemical and physical changes in the lab
4PSI3.3 Science/Physical Setting	Intermediate	Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.	develop their own mental models to explain common chemical reactions and changes in states of matter	284 284 354 357 357 359 361	states of matter and arrangement of molecules changes of state new substances are formed when a chemical change occurs chemical reactions involve rearrangement of atoms combustion reaction balancing chemical equations heartburn reaction	118 118 119 119 148 149 152 152 157	molecules in a liquid investigate melting create a temperature vs. time graph of phase change energy and phase changes reactants and products practice balancing equations write the balanced equation predict how much product formed given the reactants predict the products of double displacement reactions

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<b>Standard #: Standard/Topic</b>	<b>Level</b>	<b>Key Idea</b>	<b>Performance Indicator</b>	<b>student text pg</b>	<b>detail</b>	<b>investigation pg</b>	<b>detail</b>
4PSI4.1 Science/Physical Setting	Intermediate	Energy exists in many forms, and when these forms change energy is conserved.	describe the sources and identify the transformations of energy observed in everyday life.	87	concept of energy as stored work	36	energy conservation and the roller coaster
				88	potential and kinetic energy explained	37	investigating conservation of energy with rollercoaster
				90	conservation of energy explained	38	explore energy transformations
				91	following an energy transformation	38	conservation of energy and energy transformations
				91	understand basic forms of energy	39	make an energy flow chart
				91	energy conversions	39	identify type of energy involved
				92	energy transformations and conservation	188	specific heat and conservation of energy
				93	different forms of energy described		
				96	prove that energy is conserved		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PSI4.2 Science/Physical Setting	Intermediate	Energy exists in many forms, and when these forms change energy is conserved.	observe and describe heating and cooling events.	468	heat transfer through air	190	investigate conduction through all states of matter
				468	densely packed solids are good conductors of heat	192	investigate convection in liquids
				470	convection currents and weather	194	investigate radiation emitted by solids
				470	warming hands over candle	194	investigate radiation emitted by liquids
				472	convection currents in water		
				476	solid road surface emits radiation		
				478	apply knowledge of heat transfer to different situations		
				481	global warming		
				481	global warming and heat transfer by radiation		
				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		

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<b>Standard #: Standard/Topic</b>	<b>Level</b>	<b>Key Idea</b>	<b>Performance Indicator</b>	<b>student text pg</b>	<b>detail</b>	<b>investigation pg</b>	<b>detail</b>
4PSI4.3 Science/Physical Setting	Intermediate	Energy exists in many forms, and when these forms change energy is conserved.	observe and describe energy changes as related to chemical reactions.	381 382	exothermic reactions and MREs endothermic reactions and cold packs	158 158	investigate energy changes in chemical reactions measure energy changes in 3 different reactions

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PSI4.4 Science/Physical Setting	Intermediate	Energy exists in many forms, and when these forms change energy is conserved.	observe and describe the properties of sound, light, magnetism, and electricity.	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	electroscopes	56	build a parallel circuit
				108	how an electroscope works	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
				114	voltage is related to potential energy	60	parallel circuit and Ohm's law
				115	how to measure voltage	61	compare current and voltage and resistance in each type of circuit
				117	electrical current explained	66	build an electromagnet
				119	how to measure current	67	find out what happens to strength of electromagnet when current is increased
				123	understand the concept of electrical resistance	68	investigate how an electric motor works
				131	Ohm's law explained	73	exploring electric generators
				132	using Ohm's law to analyze circuits		
				136	potentiometer explained		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				145	parallel circuit defined	73	use magnetic induction to create an electric field
				145	holiday lights as series or parallel	90	investigate human perception of sound
				145	single path vs. branching paths	90	what is sound and how do we hear it?
				145	series circuit defined	90	investigate human perception of sound
				146	household wiring	94	does sound behave like other waves?
				147	current and voltage in series circuits	98	investigate sound and music
				151	voltage and resistance in parallel circuits	100	study what makes light
				155	analyze a parallel circuit	101	observing white light through diffraction grating
				156	analyze a series circuit	104	investigate RGB model of color
				159	magnetism explained	105	explore relationship between color and wavelength
				163	understanding magnetic fields	107	investigate reflection of light
				164	what is an electromagnet?	107	plot reflected rays from a mirror
				166	building an electromagnet	108	tracing incident and refracted rays
				166	increased current vs. strength of magnetic field	134	investigating visible light with a spectrometer
				168	how electric motors work		
				170	dissecting an electric motor		
				171	electromagnetic induction explained		
				213	how the ear works		
				217	loudness and decibels		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				219	frequency of sound and pitch		
				220	sonograms		
				220	white noise		
				220	voice recognition programs		
				222	effect of temperature on speed of sound wave		
				222	effect of medium on speed of sound wave		
				226	musical instruments		
				234	what makes light?		
				237	visible light and the electromagnetic spectrum		
				242	color and frequency of light waves		
				243	RGB model of color		
				245	we see color in terms of reflected light		
				258	refraction in optical systems		
				260	reflection and mirrors		
				263	index of refraction		
				263	index of refraction		
				474	ultraviolet and infrared light		
				476	absorption and emission		

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<b>Standard #: Standard/Topic</b>	<b>Level</b>	<b>Key Idea</b>	<b>Performance Indicator</b>	<b>student text pg</b>	<b>detail</b>	<b>investigation pg</b>	<b>detail</b>
4PSI4.5 Science/Physical Setting	Intermediate	Energy exists in many forms, and when these forms change energy is conserved.	describe situations that support the principle of conservation of energy.	88	potential and kinetic energy explained	36	energy conservation and the roller coaster
				90	conservation of energy explained	37	investigating conservation of energy with rollercoaster
				91	following an energy transformation	38	identify potential/kinetic energy conversions
				91	energy conversions	38	explore energy transformations
				92	energy transformations and conservation	38	conservation of energy and energy transformations
				93	different forms of energy described	188	specific heat and conservation of energy
				96	prove that energy is conserved		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PSI5.1 Science/Physical Setting	Intermediate	Energy and matter interact through forces that result in changes in motion.	describe different patterns of motion of objects.	14	how to calculate speed	8	calculating speed
				20	calculate speed of car	9	collect data and calculate speed of car
				20	find speed of bumblebee	10	calculate speed of the car
				24	accurate speed measurements	12	model the car's motion graphically
				29	position vs. time graph discussion	12	find speed of car at different positions
				30	position vs. time graphs	12	calculate speed of moving car
				32	average speed vs. instantaneous	13	make a position vs. time graph
				32	average speed discussed	14	calculate speed of car at two places on the ramp
				37	speed vs. time graph discussion	14	acceleration is the rate at which speed changes
				37	speed vs. time graphs	15	make a speed vs. time graph
				42	calculate speed from distance/time graph	15	changes in motion can be represented graphically
				45	Newton's third law summarized	16	thinking about force
				45	Newton's first law summarized	16	2nd law
				45	Newton's second law summarized	17	calculate speed of car
				48	Newton's first law in detail	20	force and motion with car and ramp
				49	Newton's second law in detail	20	investigate effect of gravity on motion
				52	the effect of gravity	21	effect of friction on the car
				56	friction explained		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				59	Newton's third law in detail	23	using 3rd law to explain common phenomena
				64	research effect of friction on human joints	25	discover mechanical advantage of ropes and pulleys
				69	how to calculate mechanical advantage	27	set up a lever that has mechanical advantage
				71	how a lever works	36	find speed of marble
				78	set up a lever with MA greater than 1		
				79	calculate mechanical advantage		

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4PSI5.2 Science/Physical Setting	Intermediate	Energy and matter interact through forces that result in changes in motion.	observe, describe, and compare effects of forces (gravity, electric current, and magnetism) on the motion of objects.	52	gravity depends on mass	20	investigate effect of gravity on motion
				52	the effect of gravity	42	investigate electric charge
				54	Newton's law of universal gravitation	46	investigate concept of electric current
				55	calculating gravitational force between objects	66	build an electromagnet
				101	concept of electric current	67	find out what happens to strength of electromagnet when current is increased
				105	charge is a fundamental property of matter		
				106	electrical force is incredibly strong!		
				106	electrical forces		
				106	static charge discussed		
				107	explanation of coulomb		
				108	electroscopes		
				108	how an electroscope works		
				117	electrical current explained		
				119	how to measure current		
				159	magnetism explained		
				163	understanding magnetic fields		
				164	what is an electromagnet?		
				166	increased current vs. strength of magnetic field		
				166	building an electromagnet		