

Correlation to New York Learning Standards for Math, Science, and Technology
Foundations of Physical Science with Earth and Space 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	why make models?	6	asking questions and learning about natural world
				24	making a graph	13	graph distance vs. time
				24	what is a scientific model?	15	construct a quantitative graphical model
				24	scientific models	21	construct reasonable explanation based on data
				26	creating graphs	25	create a mathematical model
				41	make a graph	27	find math rule for lever equilibrium
				42	interpreting distance/time graph	28	derive a math formula
				459	heat equation	35	study data and determine importance of height on speed of marble
				473	why do ears pop	37	organize data into a graph of speed vs. height
				485	computer modeling to predict greenhouse effects	45	analyze data and explain a rule
				494	modeling air currents	51	graph voltage vs. current
				504	meteorologists use atmospheric pressure data to understand movement of weather systems	121	graph mass vs. volume
				518	create a model (#1)	147	organize observations into a category table
				524	model of Earth's history	151	does your experiment agree with law of conservation of mass?
				533	modeling plate boundaries	163	evaluating choice of favorite car
				576	rock cycle model		
				614	solar system modeling		
				624	model of the sun's anatomy		
645	inverse square law						

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				648	evidence for Big Bang theory	185	constructing a graph of drops of acid vs pH
						187	construct a graphical model
						187	find equation for trend line
						189	construct a temperature vs. time graph
						197	constructing a graph from atmospheric pressure data
						202	modeling the effect of greenhouse gases on Earth's temperature
						203	graphing water and ice temperature readings
						206	constructing a graph of time vs. temperature
						212	modeling underwater rivers and waterfalls and springs
						215	the food paradox of the oceans
						231	evaluating your completed bathymetric map
						232	construct a model that simulates an earthquake
						247	evaluate your ability to interpret rock formations
						257	inverse square law

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						258 setting up a scale model of the solar system	
						268 discovering the mathematical relationship between apparent brightness and distance	

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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
				448	research local water supply history	45	analyze data and explain a rule
				468	research the history of heat and temperature	130	investigate Rutherford's gold foil experiment
				627	research space solar power	163	evaluating choice of favorite car
						177	research pH indicators
						180	researching where your water comes from
						201	researching the causes of ozone
						207	researching how bodies of water affect climate
						222	researching an animal that is adapted to live in the biome you studied
						227	researching forensic science

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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 47 129 145 151 157 197	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 evaluating your aneroid barometer design

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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
				476	atmospheric pressure at various altitudes graph	194	design and construct an aneroid barometer
				605	calculating Earth's dimensions	217	determining relationship between temperature of the atmosphere and relative humidity
				629	converting light years to astronomical units		
				645	apparent brightness vs. distance graph	218	interpreting Doppler radar images
				651	use the diagram to answer the questions (#2)	237	finding a pattern of volcanoes on a bathymetric map
				651	arrange the items in the table (#3)		
				651	use the diagram to answer the questions (#4)		

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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 9 16 21 26 27 27 34 43 75	predict which car will move fastest doing a controlled experiment test the effect of one other variable design your own experiment design three experiments using car and ramp devise a hypothesis decide how to vary the force on the car for this experiment choose independent and dependent variables for graph what variables can be changed? think about the variables recognize variables where does the marble move the fastest? how did A and B tapes acquire different charge? design pendulum experiment

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						75	investigate variables that affect the period of a pendulum
						93	decision trees and the advantage of doing multiple trials
						151	explain how hypothesis compares to results
						151	design experiment to find out if mass is conserved
						151	perform the experiment you designed
						170	what three factors influence dissolving rate?
						170	devise hypothesis and explain
						190	effect of changing mass on collected data
						208	testing hypothesis of why seasons occur against your observations in the investigation
						211	determining whether distance from light source or axial tilt plays a more significant role in causing the seasons
						233	identifying how the earthquake model represents an earthquake

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
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 explain how you arrived at your answer use data to infer correct relationship between variables 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	discuss an explanation with your group
						47	present and defend an explanation
						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
						182	making hypotheses and testing them against observations
						182	simulating the effect of acid rain on daphnia
						185	analyzing the results of the buffered acid experiment
						188	conducting investigation of efficiency of immersion heater

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
						193 explaining efficiency of heat transfer based on data	
						193 conducting experiments on heat transfer	
						205 investigating how specific heat of water regulates Earth's temperature	
						224 reconstruct a series of events from clues	
						235 interpreting how the drumming affects the intensity of the earthquake in the model	

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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	experimentation begins with a question	7	compare results with hypothesis
				9	steps in the scientific method	7	design your own experiment
				10	forming a hypothesis	9	design three experiments and choose equipment
				19	design your own experiment	9	design three experiments and choose technology
				19	design your own experiment	9	design three experiments and choose equipment
				42	devise an experiment	9	design three experiments using car and ramp
				288	find the thickness of a single card	16	decide how to vary the force on the car for this experiment
				448	describe steps you would take to determine whether pH affects frog population	26	what variables can be changed?
				530	proving hypotheses for sea-floor spreading	75	plan three experiments to determine which variable affects the period of a pendulum
				580	form a hypothesis (#7)	75	design pendulum experiment
						93	decision trees and the advantage of doing multiple trials
						145	plan a procedure and select necessary equipment

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						151	plan procedures and select materials
						151	design experiment to find out if mass is conserved
						170	what three factors influence dissolving rate?
						170	which factor will produce fastest dissolving rate?
						170	devise hypothesis and explain
						182	formulate hypothesis
						194	design and construct an aneroid barometer
						208	formulate a hypothesis about why the seasons occur
						233	identifying how the earthquake model represents an earthquake
						237	develop a research plan for studying volcanoes

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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 75 145 151 170 178 182	perform your own experiment conduct three experiments with appropriate equipment conduct car/ramp experiment selecting ramp and photogates 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 select materials from list write a procedure visit local water supply and perform testing simulating the effect of acid rain on daphnia

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						188	conducting investigation of efficiency of immersion heater
						193	conducting experiments on heat transfer
						196	writing a procedure for constructing a pointer for an aneroid barometer
						198	making qualitative observations of the amount of ozone present in the school environment
						205	investigating how specific heat of water regulates Earth's temperature
						209	measuring the intensity of light using an electric meter and solar cell and light bulb
						214	develop a procedure to create an underwater spring
						252	identifying the parts of a refracting telescope and making observations of the moon's surface

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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	experimentation begins with a question	6	how do we ask questions and get answers from nature?
				10	the research question and hypothesis	7	design your own experiment
				19	design your own experiment	9	design three experiments using car and ramp
				20	finding variability in data	16	decide how to vary the force on the car for this experiment
				42	devise an experiment	18	use data to describe relationship between force and motion
				79	look at force data and decide the usefulness of a machine	19	use data to infer correct relationship between variables
				429	why haven't we run out of water	26	what variables can be changed?
				434	what is in your tap water	30	interpret block and tackle data
				437	what is acid rain	75	design pendulum experiment
				441	why are oceans salty	93	decision trees and the advantage of doing multiple trials
				456	asking questions pertaining to specific heat and heat flow	141	build models of Na and Cl and use them to explain bonding
				472	why is Earth's atmosphere different from other planets	151	design experiment to find out if mass is conserved
				473	why do ears pop		
				492	why does Earth have seasons		
				501	how does rain form		
				509	how do animals survive in the desert		

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				515	what is a carbon sink	170	what three factors influence dissolving rate?
				534	why doesn't Earth get bigger and bigger	182	making hypotheses and testing them against observations
				588	what causes eclipses	185	analyzing the results of the buffered acid experiment
				621	is Pluto a planet	193	explaining efficiency of heat transfer based on data
						224	reconstruct a series of events from clues
						233	identifying how the earthquake model represents an earthquake
						235	interpreting how the drumming affects the intensity of the earthquake in the model

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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.	473 504 648	why do ears pop meteorologists use atmospheric pressure data to understand movement of weather systems evidence for Big Bang theory	6 21 35 45 215	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 the food paradox of the oceans
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.			145 179 181 183	present findings to the class create water quality report write paragraph to explain results write summary of findings

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1SII.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	what evidence is there in support of your hypothesis?
				521	relative dating and modern geology based on Steno's theories	39	critique group's explanation of energy transformations
				524	Kelvin's calculations of Earth's age	39	review energy theory in context of everyday scenarios
				528	theory of plate tectonics		
				529	critiquing Wegener's theories of continental drift	39	analyze energy transformations in different scenarios
				563	Darwin's theories of the Andes formation	77	show how energy loss data could be applied to designing a real clock
				566	what causes ice ages		
				611	theories of origin of the moon	77	compare law of conservation of energy to motion of pendulum
				612	early theories of the solar system	151	review your hypothesis
				647	Big Bang theory	171	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 9 21 27 34 35 43 45 75 101 117 151	predict which car will move fastest test the effect of one other variable devise a hypothesis 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	perform the experiment you designed
						151	explain how hypothesis compares to results
						157	add new rules to list based on findings
						170	devise hypothesis and explain
						183	specifying how the daphnia experiment could be improved
						197	evaluating your aneroid barometer design
						208	testing hypothesis of why seasons occur against your observations in the investigation
						231	evaluating your completed bathymetric map
						247	evaluate your ability to interpret rock formations

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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 42 288 435 438 456 460 486 497	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 making observations and asking questions what causes acid rain determining effect of changing mass on temperature changes thermal equilibrium observing an aurora factors that shape the weather	4 5 6 6 6 7 7 7 7 9 9 9 9 9 9 14	difference between precise and accurate data measuring metric and english lengths predict which car will move fastest electronic timer and release technique measure time test the effect of one other variable design your own experiment doing a controlled experiment record time interval design three experiments and choose technology devise a hypothesis design three experiments using car and ramp design three experiments and choose equipment design three experiments and choose equipment collect speed data record three different time intervals

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				608	relationship between orbital speed and distance between two objects	16	decide how to vary the force on the car for this experiment
				630	use the data to answer the questions	16	measure force
				630	what evidence was used to predict the existence of the Kuiper Belt?	17	record times
				652	analysis with a spectrometer (#4)	21	determine effect of increasing mass
						21	choose independent and dependent variables for graph
						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

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						75	investigate variables that affect the period of a pendulum
						75	design pendulum experiment
						75	collect mass and amplitude data
						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	explain how hypothesis compares to results
						151	perform the experiment you designed
						151	plan procedures and select materials

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						170	what three factors influence dissolving rate?
						170	devise hypothesis and explain
						171	collect time data and record observations
						182	observing daphnia and recording movements and behavior
						182	making detailed observations
						184	collecting pH readings while adding carbon dioxide
						186	collecting temperature data
						186	measure temperature
						189	collecting time and temperature data
						190	effect of changing mass on collected data
						190	effect of changing mass on data
						193	collecting and recording time and temperature data
						194	design and construct an aneroid barometer

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						197	identifying relationships between air pressure and weather
						199	collecting Schönbein strips for detecting ozone
						202	collecting data of temperature and sensations
						206	identifying relationship between percent of Earth covered in water and temperature range
						206	collecting temperature and time data
						208	testing hypothesis of why seasons occur against your observations in the investigation
						210	collecting qualitative data of light intensity at scale distance from the sun
						211	determining whether distance from light source or axial tilt plays a more significant role in causing the seasons
						217	collecting wet and dry bulb temperature readings
						224	sequencing events

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						233	identifying how the earthquake model represents an earthquake
						235	concluding which conditions affect the timing and duration and intensity of an earthquake based on observation
						241	justify which scenario was most likely
						243	recording observations of crystal growing
						249	using your sundial to collect accurate data
						251	recording the changes in the moon over a month
						253	calibrating your telescope
						256	investigation discovering relationship between orbital speed and distance

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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 12 435 486 630 630 652	measuring distance importance of reliable and accurate data collection making observations and asking questions observing an aurora what evidence was used to predict the existence of the Kuiper Belt? use the data to answer the questions analysis with a spectrometer (#4)	4 5 6 6 7 7 9 9 10 10 12 12 14 16 16	difference between precise and accurate data measuring metric and english lengths measure time electronic timer and release technique perform your own experiment record time interval conduct three experiments with appropriate equipment construct a data table collect speed data selecting ramp and photogates conduct car/ramp experiment select equipment and set up experiment understand and use data table record three different time intervals measure force investigate Newton's 2nd law

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						17	record times
						17	record results in data table
						18	organize different combinations of data
						24	collect weight data
						24	use data table to record results
						25	collect force data
						27	write down the number of weights you use
						27	use data table to record results
						30	rigging block and tackle
						30	record ropes and pulley data in table
						34	investigate motion on a rollercoaster
						36	organize data into a table
						36	collect precise speed and height data
						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	create data table for self-designed experiment
						75	collect mass and amplitude data
						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	select materials from list
						151	design a data table
						171	collect time data and record observations
						171	use data table for observations
						178	visit local water supply and perform testing
						181	organize water quality data into a table
						182	observing daphnia and recording movements and behavior

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						182	simulating the effect of acid rain on daphnia
						182	making detailed observations
						184	collecting pH readings while adding carbon dioxide
						186	measure temperature
						186	collecting temperature data
						188	conducting investigation of efficiency of immersion heater
						189	collecting time and temperature data
						193	collecting and recording time and temperature data
						193	conducting experiments on heat transfer
						198	making qualitative observations of the amount of ozone present in the school environment
						199	collecting Schönbein strips for detecting ozone
						202	collecting data of temperature and sensations

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Standard #: Standard/Topi	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
						205	investigating how specific heat of water regulates Earth's temperature
						206	collecting temperature and time data
						209	measuring the intensity of light using an electric meter and solar cell and light bulb
						210	collecting qualitative data of light intensity at scale distance from the sun
						217	collecting wet and dry bulb temperature readings
						243	recording observations of crystal growing
						249	using your sundial to collect accurate data
						251	recording the changes in the moon over a month
						252	identifying the parts of a refracting telescope and making observations of the moon's surface
						253	calibrating your telescope

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PSC1.1 Science/Physical Setting	Commencement	The Earth and celestial phenomena can be described by principles of relative motion and perspective.	explain complex phenomena, such as tides, variations in day length, solar insolation, apparent motion of the planets, and annual traverse of the constellations	491	the effects of Earth's rotation on daytime heating and nighttime cooling	208	developing a hypothesis about why the seasons occur
				492	Earth's tilt causes seasons	209	investigating factors which cause the seasons
				492	Earth's tilt causes seasons	210	investigating how the distance of Earth from the sun affects its intensity
				518	create a model to explain why Earth has seasons	211	investigating how Earth's tilt affects the sun's intensity
				584	the lunar cycle	238	why studying the moon's surface is useful for understanding Earth
				585	Earth's rotation and patterns of day and night	248	building a sundial to keep track of daily time based on the cycles between Earth and the sun
				587	axial tilt causes the seasons	250	modeling the lunar cycle
				588	solar eclipses	251	constructing a lunar calendar
				588	lunar eclipses	251	tracking the moon's phases in the night sky
				589	solar eclipses	256	simulate an object in orbit and investigate how orbital period varies within distance
				589	solar eclipses		
				601	identify seasons		
				607	properties of the moon		
				608	the moon as a satellite of Earth		
				609	the moon's effect on tides on Earth		
				610	the Earth-moon system		
				611	giant impact theory		
				612	orbits of planets around the sun		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				619	asteroids and comets		
				620	meteors and meteorites and the Kuiper Belt		
				633	the appearance of constellations in the night sky		
				635	differences in colors of stars is related to their temperatures		
				636	brightness of stars' appearance		
				643	the appearance of the disk of the Milky Way in the night sky		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PSC1.2 Science/Physical Setting	Commencement	The Earth and celestial phenomena can be described by principles of relative motion and perspective.	describe current theories about the origin of the universe and solar system	594 595 596 597 598 611 612 621 634 641 647 648 649	history of the telescope types and uses of telescopes types and uses of telescopes satellites as tools of astronomy spacecraft as tools of astronomy historical theories of the origin of the moon historical theories about the solar system historical theories of which objects were planets the use of spectroscopy to analyze stars how the solar system was formed the Big Bang theory of the origin of the universe evidence for the Big Bang theory evidence for the Big Bang theory	264 268	understand why spectroscopy is an important tool of astronomers measuring apparent brightness to calculate the distance to stars and galaxies

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PSC2.1 Science/Physical Setting	Commencement	Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.	use the concepts of density and heat energy to explain observations of weather patterns, seasonal changes, and the movements of the Earth's plates	462	heat transfer through air	192	investigate convection in liquids
				462	densely packed solids are good conductors of heat	192	investigate heat transfer through a liquid by natural convection
				463	convection currents and weather	193	investigate heat transfer through a liquid by forced convection
				463	warming hands over candle	209	investigating factors which cause the seasons
				464	convection currents in water	213	exploring how temperature-dependent layering creates currents
				465	transfer of heat by radiation	219	use radar to detect a tornado
				465	solid road surface emits radiation	220	using radar to track a hurricane
				480	transfer of energy in and out of Earth's atmosphere		
				482	global warming and heat transfer by radiation		
				483	global temperature changing over time		
				485	Earth's internal energy		
				492	Earth's tilt causes seasons		
				493	convection currents in the atmosphere		
				493	apply knowledge of heat transfer to different situations		
				495	global wind patterns		
				497	factors which influence the weather		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				499	cloud formation		
				502	cold fronts		
				502	effects of moving air masses		
				503	jet streams		
				503	warm fronts		
				505	description of thunderstorms		
				506	description of hurricanes		
				507	description of tornadoes		
				518	create a model to explain why Earth has seasons		
				525	convection inside Earth		
				528	Earth's surface is changing		
				528	definition of plate tectonics		
				532	theory of plate tectonics		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PSC2.2 Science/Physical Setting	Commencement	Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.	Explain how incoming solar radiations, ocean currents, and land masses affect weather and climate.	491	Earth's temperature varies with latitude	207	research how large bodies of water affect climate
				496	effects of the Gulf Stream on climate of Great Britain	207	research how large bodies of water affect climate
				496	descriptions of ocean currents and their effects on climate	215	understanding the Atlantic gyre
				508	causes and effects of the El Nino Southern Oscillation	223	research a particular biome
				510	effect of cold ocean currents on formation of fog deserts		
				510	different types of deserts and how they are formed		
				511	effect of warm ocean currents on formation of tropical rainforest		
				511	how tropical rainforests are formed		
				513	effect of large bodies of water on climate		
				515	alpine tundra occurs at high altitudes		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
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	investigate melting
				284	changes of state	118	molecules in a liquid
				285	characteristics of matter related to its state	118	think of melting process at molecular level
				288	create a poster of matter classification	118	observe melting process and study quantitatively
				291	density is independent of amount of substance	119	energy and phase changes
				292	hardness is a physical property of matter	132	building atom models
				292	elasticity is a physical property of matter	132	atomic number determines what element that atom is
				293	brittleness is a physical property of matter	132	comparing atoms
				294	malleability is a physical property of matter	133	location of electrons in atom
				294	tensile strength is a physical property of matter	133	protons and neutrons
				311	protons/neutrons/electrons	136	model stable and neutral atoms
				311	location/size/charge of subatomic particles	137	build atomic models
				311	all matter is formed from atoms	137	importance of atomic number
				311	all matter is formed from atoms	140	review subatomic particles
				169	investigate solutions and colloids and suspensions		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				315	atoms of same element have same atomic number		
				318	proton/electron attraction		
				405	molecular structure of ice		
				498	phases changes in the atmosphere		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
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	why do atoms form chemical bonds?
				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
						141	when an atom ionizes
				329	periodic table columns and valence electrons	141	build model of Na and Cl atoms and explain why they bond to form a molecule
				330	ionic bonds		
				330	bonding and periodic table position	142	arrangement of electrons and groups of elements
				331	covalent bonds	142	why 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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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				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	heartburn reaction		
				361	chemical reactions in living systems		
				371	which of the equations is balanced?		
				375	synthesis or addition reactions		
				376	decomposition reactions		
				377	single displacement reactions		
				377	double 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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Standard #: Standard/Topi	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				397	carbon reactions		
				409	dissolving an ionic compound		
				410	solute dissolution depends on chemical bonds		
				438	chemical reactions and the formation of acid rain		
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?	194	building a compression chamber to observe changes in atm pressure
				364	formation of petroleum is a very slow chemical reaction		
				422	acids and bases and enzymes in digestion	196	correcting your barometer's readings for the effects of temperature on a gas

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
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		
				479	ultraviolet and infrared light		
				480	energy and radiation relationships		
				537	potential energy transformed to kinetic energy causes earthquakes		
				623	energy from the sun		
				626	the sun's energy reaches Earth in the form of electromagnetic waves		
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
				452	molecular motion increases when temperature increases		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
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.	213 217 219 221 237 242	how the ear works loudness and decibels frequency of sound and pitch importance of wavelength of sound waves light waves and the electromagnetic spectrum color and frequency of light waves	83 86 90 90 105 265	find speed of a wave adjust frequency of a standing wave investigate human perception of sound what is sound and how do we hear it? explore relationship between color and wavelength an element's spectral lines correspond to specific wavelengths of light
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.	387 388 393 393 400 623	fusion and fission explained nuclear vs chemical reactions radioisotopes in science and medicine carbon dating research pros and cons of nuclear technology nuclear fusion and the sun	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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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
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	exploring acceleration on a ramp
				32	average speed discussed	14	calculate acceleration of car on ramp
				33	understanding acceleration	14	acceleration is the rate at which speed changes
				35	how to calculate acceleration	14	calculate speed of car at two places on the ramp
				36	examples of acceleration	15	make a speed vs. time graph
				37	speed vs. time graphs	16	2nd law
				41	find acceleration of car	16	thinking about force
				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	force is related to acceleration	20	investigate effect of gravity on motion
				49	Newton's second law in detail	21	effect of friction on the car
				50	Newton's second law applied	22	car and ramp and Newton's 3rd law
				51	net force explained	23	using 3rd law to explain common phenomena
				51	balanced and unbalanced forces	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	law of conservation of momentum		
				60	how to calculate momentum		
				64	calculate momentum		
				64	research effect of friction on human joints		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				64	solving problems using $f=ma$		
				599	Newton's first law of motion and the space shuttle		
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	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
				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	forces in the nucleus	136	strong force
				389	strong nuclear force		
				389	electromagnetic force		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PS1.1 Science/Physical Setting	Intermediate	The Earth and celestial phenomena can be described by principles of relative motion and perspective.	explain daily, monthly, and seasonal changes on earth	491	the effects of Earth's rotation on daytime heating and nighttime cooling	208	developing a hypothesis about why the seasons occur
				492	Earth's tilt causes seasons	209	investigating factors which cause the seasons
				492	Earth's tilt causes seasons	210	investigating how the distance of Earth from the sun affects its intensity
				518	create a model to explain why Earth has seasons	211	investigating how Earth's tilt affects the sun's intensity
				584	the lunar cycle	238	why studying the moon's surface is useful for understanding Earth
				585	Earth's rotation and patterns of day and night	248	building a sundial to keep track of daily time based on the cycles between Earth and the sun
				587	axial tilt causes the seasons	250	modeling the lunar cycle
				588	solar eclipses	251	constructing a lunar calendar
				588	lunar eclipses		
				589	solar eclipses		
				589	solar eclipses		
				601	identify seasons		
				607	properties of the moon		
				608	the moon as a satellite of Earth		
				609	the moon's effect on tides on Earth		
				610	the Earth-moon system		
				611	giant impact theory		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PSI2.1 Science/Physical Setting	Intermediate	Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.	explain how the atmosphere (air), hydrosphere (water), and lithosphere (land) interact, evolve, and change	439	illustration of acid rain formation	207	research how large bodies of water affect climate
				440	oceans as part of the hydrosphere	215	understanding the Atlantic gyre
				471	description of Earth's atmosphere		
				472	effect of life on Earth's atmosphere		
				477	layers of the atmosphere		
				478	layers of the atmosphere		
				482	changes to the oceans due to increasing global temperatures		
				495	global wind patterns		
				496	descriptions of ocean currents and their effects on climate		
				497	water in the atmosphere affects weather patterns		
				502	cold fronts		
				502	effects of moving air masses		
				503	jet streams		
				503	warm fronts		
				568	how urban sprawl changes local climate		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PS12.2 Science/Physical Setting	Intermediate	Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.	describe volcano and earthquake patterns, the rock cycle, and weather and climate changes	480	transfer of energy in and out of Earth's atmosphere	219	use radar to detect a tornado
				481	global warming	220	using radar to track a hurricane
				483	global temperature changing over time	228	reading a bathymetric map
				495	global wind patterns	229	using a geologic hazard map of frequent earthquakes
				497	factors which influence the weather		
				499	cloud formation	230	predicting plate movement over 50 million years and the resultant land features
				502	cold fronts		
				502	effects of moving air masses	236	understanding the Volcanic Explosivity Index
				503	jet streams	237	finding a pattern of volcanoes related to the locations of plate boundaries
				503	warm fronts		
				505	description of thunderstorms	240	estimating the effects of meteor impacts on Earth
				506	description of hurricanes	241	identifying which geologic features on Earth were caused by meteors
				507	description of tornadoes		
				528	Earth's surface is changing		
				528	definition of plate tectonics		
				528	predicting what Earth might look like in 50 million years		
				532	theory of plate tectonics		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				533	activity of Earth's crust at plate boundaries		
				534	balance of creating and consuming Earth's crust		
				534	land features resulting from divergent plate boundaries		
				535	resulting land features from subduction		
				536	land features resulting from transform plate boundaries		
				537	causes and descriptions of earthquakes		
				539	earthquakes rating scales		
				540	where earthquakes occur		
				541	earthquake hazard map		
				547	predict separation of North America and Europe in 75 million years		
				548	predict effects of divergent plate boundaries on Great Rift Valley		
				551	structure of a volcano		
				554	figure showing structure of different types of volcanoes		
				554	types and shapes of volcanoes		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				555	shield volcanoes		
				555	formation of shield volcanoes due to hot spots		
				555	formation of Hawaiian Islands due to volcanic activity		
				556	formation of stratovolcanoes due to subduction		
				556	stratovolcanoes		
				558	volcanoes shape the Earth		
				562	constructive and destructive processes		
				562	constructive and destructive processes		
				563	constructive process of mountain building		
				563	mountain-building		
				564	changes in land features due to erosion		
				564	the destructive process of erosion		
				565	wind erosion		
				565	formation of soil		
				566	effect of glaciers on land		
				567	geologic hazard maps		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				576	the rock cycle		
				576	the rock cycle		
				580	using a geologic hazard map		

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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	elasticity is a physical property of matter	128	use CPO viscometer to study viscosity
				292	hardness is a physical property of matter	212	investigate density changes in the oceans as the cause of ocean layering
				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		
				305	viscosity of glue mixtures		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PS13.2 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.	284 353 355 357 361 372 498	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 phases changes in the atmosphere	119 146	energy and phase changes investigate and observe chemical and physical changes in the lab

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
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	states of matter and arrangement of molecules	118	investigate melting
				284	changes of state	118	molecules in a liquid
				354	new substances are formed when a chemical change occurs	119	create a temperature vs. time graph of phase change
				357	chemical reactions involve rearrangement of atoms	119	energy and phase changes
				357	combustion reaction	148	reactants and products
				359	balancing chemical equations	149	practice balancing equations
				361	heartburn reaction	152	write the balanced equation
				405	molecular structure of ice	152	predict how much product formed given the reactants
				498	phases changes in the atmosphere	157	predict the products of double displacement reactions
						204	compare the shape of the water line and the ice line on the temperature/time graph

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
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		
				93	different forms of energy described		
				96	prove that energy is conserved		
				480	distribution of incoming solar radiation		
				481	Earth's "energy budget"		
				485	Earth's internal energy		
				623	energy from the sun		
				626	harnessing the sun's energy		

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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.	462 462 463 463 464 465 465 482 493	densely packed solids are good conductors of heat heat transfer through air convection currents and weather warming hands over candle convection currents in water transfer of heat by radiation solid road surface emits radiation global warming and heat transfer by radiation apply knowledge of heat transfer to different situations	192	investigate convection in liquids
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
4PS14.4 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	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
				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	62	describing forces that magnets exert on each other
				119	how to measure current	64	testing materials to see if they are affected by magnets
				123	understand the concept of electrical resistance	66	build an electromagnet
				131	Ohm's law explained	66	compare electromagnets and permanent magnets
				132	using Ohm's law to analyze circuits		
136	potentiometer explained						

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Standard #: Standard/Topi	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				145	parallel circuit defined	67	find out what happens to strength of electromagnet when current is increased
				145	single path vs. branching paths	68	investigate how an electric motor works
				145	series circuit defined	73	exploring electric generators
				145	holiday lights as series or parallel	73	use magnetic induction to create an electric field
				146	household wiring	90	what is sound and how do we hear it?
				147	current and voltage in series circuits	90	investigate human perception of sound
				151	voltage and resistance in parallel circuits	90	investigate human perception of sound
				155	analyze a parallel circuit	94	does sound behave like other waves?
				156	analyze a series circuit	98	investigate sound and music
				159	magnetism explained	100	study what makes light
				163	understanding magnetic fields	101	observing white light through diffraction grating
				164	what is an electromagnet?	104	investigate RGB model of color
				166	increased current vs. strength of magnetic field	105	explore relationship between color and wavelength
				166	building an electromagnet	106	investigate reflection of light
				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	107	plot reflected rays from a mirror
				220	white noise	108	tracing incident and refracted rays
				220	sonograms		
				220	voice recognition programs	134	investigating visible light with a spectrometer
				222	effect of temperature on speed of sound wave	265	an element's spectral lines correspond to specific wavelengths of light
				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		
				479	ultraviolet and infrared light		
				480	absorption and emission		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PS14.5 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		
				96	prove that energy is conserved		
				537	potential energy transformed to kinetic energy causes earthquakes		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
4PS15.1 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		
				24	accurate speed measurements	10	calculate speed of the car
				29	position vs. time graph discussion	12	model the car's motion graphically
				30	position vs. time graphs	12	find speed of car at different positions
				32	average speed vs. instantaneous	12	calculate speed of moving car
				32	average speed discussed	13	make a position vs. time graph
				37	speed vs. time graph discussion	14	calculate speed of car at two places on the ramp
				37	speed vs. time graphs	14	acceleration is the rate at which speed changes
				42	calculate speed from distance/time graph	15	changes in motion can be represented graphically
				45	Newton's third law summarized	15	make a speed vs. time graph
				45	Newton's first law summarized	15	make a speed vs. time graph
				45	Newton's second law summarized	16	thinking about force
				48	Newton's first law in detail	16	2nd law
				49	Newton's second law in detail	17	calculate speed of car
				52	the effect of gravity	20	force and motion with car and ramp
				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	20	investigate effect of gravity on motion
				64	research effect of friction on human joints	21	effect of friction on the car
				69	how to calculate mechanical advantage	23	using 3rd law to explain common phenomena
				71	how a lever works	25	discover mechanical advantage of ropes and pulleys
				78	set up a lever with MA greater than 1	27	set up a lever that has mechanical advantage
				79	calculate mechanical advantage	36	find speed of marble

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
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	62	describing forces that magnets exert on each other
				101	concept of electric current	64	testing materials to see if they are affected by magnets
				105	charge is a fundamental property of matter	66	compare electromagnets and permanent magnets
				106	static charge discussed	66	build an electromagnet
				106	electrical force is incredibly strong!	67	find out what happens to strength of electromagnet when current is increased
				106	electrical forces	257	relating the relationship between orbital speed and distance to the equation of universal gravitation
				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	building an electromagnet		
				166	increased current vs. strength of magnetic field		

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Standard #: Standard/Topic	Level	Key Idea	Performance Indicator	student text pg	detail	investigation pg	detail
				606	Newton's law of universal gravitation		