

Correlation to Kansas Science Education Standards (draft 2d)
Foundations of Physical Science Student Text and Investigation Manual

Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
1.1.1 SCIENCE AS INQUIRY – The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry.	8 - 12	The student will demonstrate the abilities necessary to do scientific inquiry.	The student actively engages in asking and evaluating research questions.	10 the research question and hypothesis	6 how do we ask questions and get answers from nature? 7 perform your own experiment 10 conduct car/ramp experiment 16 investigate Newton's 2nd law 34 investigate motion on a rollercoaster 75 perform self-designed experiment 166 which method will give fastest dissolving rate? 198 which type of food contains the most energy?

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
1.1.2 SCIENCE AS INQUIRY – The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry.	8 - 12	The student will demonstrate the abilities necessary to do scientific inquiry.	The student actively engages in investigations, including developing questions, gathering and analyzing data, and designing and conducting research	7 experimentation begins with a question 9 steps in the scientific method 10 forming a hypothesis 11 control and experimental variables 12 writing lab procedures 19 design your own experiment 19 design your own experiment 26 independent and dependent variables 42 devise an experiment	7 doing a controlled experiment 7 design your own experiment 7 compare results with hypothesis 7 perform your own experiment 9 design three experiments using car and ramp 9 conduct three experiments with appropriate equipment 10 conduct car/ramp experiment 10 selecting ramp and photogates 12 select equipment and set up experiment 16 investigate Newton's 2nd law 16 decide how to vary the force on the car for this experiment 21 choose independent and dependent variables for graph 26 what variables can be changed?

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					<p>27 recognize variables</p> <p>30 rigging block and tackle</p> <p>34 investigate motion on a rollercoaster</p> <p>40 choose circuit parts to light a bulb</p> <p>75 design pendulum experiment</p> <p>75 perform self-designed experiment</p> <p>75 plan three experiments to determine which variable affects the period of a pendulum</p> <p>93 decision trees and the advantage of doing multiple trials</p> <p>145 carry out procedure and select equipment</p> <p>151 write a procedure</p> <p>151 select materials from list</p> <p>151 design experiment to find out if mass is conserved</p> <p>166 what three factors influence dissolving rate?</p> <p>166 which factor will produce fastest dissolving rate?</p> <p>166 write a procedure</p>

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1.1.3 SCIENCE AS INQUIRY – The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry.	8 - 12	The student will demonstrate the abilities necessary to do scientific inquiry.	The student actively engages in using technological tools and mathematics in their own scientific investigations.	24 using an electronic timer 26 drawing a best fit curve 31 determining slope of a line 38 determining slope of a line 42 interpreting distance/time graph	data tables and graphs can be created on computer or graphing calculator 11 draw best fit curve 12 using photogates 13 draw best fit curve 14 using photogates 15 calculating acceleration from the slope of the line 16 use a force scale 17 use photogates to study car on ramp 18 use a balance to find mass of car 25 create a mathematical model 27 find math rule for lever equilibrium 28 derive a math formula 30 use force scale 44 using electrical meter 46 using electrical meter 48 using electrical meter 50 using electrical meter 86 use CPO Timer to measure frequency

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					<p>107 study reflection of laser beam</p> <p>108 study refraction of laser beam</p> <p>113 trace critical angle with a laser beam</p> <p>158 use a thermometer</p>

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1.1.4 SCIENCE AS INQUIRY – The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry.	8 - 12	The student will demonstrate the abilities necessary to do scientific inquiry.	The student actively engages in conducting an inquiry, formulating and revising his or her scientific explanations and models, and recognizing that potential alternative explanations and models should be considered.	11	control and experimental variables	7	doing a controlled experiment
				11	controlling variables in experiments	7	what variables should be controlled?
				19	which group did the best experiment?	9	construct a data table
				19	did you run a controlled experiment?	11	calculate % error
				20	finding variability in data	12	understand and use data table
				20	what factors could explain the variability in their data?	13	graph distance vs. time
				24	making a graph	14	record three different time intervals
				24	interpretations of patterns in data	15	interpret a speed vs. time graph
				26	independent and dependent variables	15	construct a quantitative graphical model
				26	creating graphs	17	record results in data table
				27	reading a graph	18	organize different combinations of data
				41	make a graph	18	use data to describe relationship between force and motion
				42	interpreting distance/time graph	18	evaluate graphs as to whether or not they show relationships between variables
				78	analyze lever diagram		
				79	look at force data and decide the usefulness of a machine	19	use data to infer correct relationship between variables

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					<p>21 construct reasonable explanation based on data</p> <p>21 choose independent and dependent variables for graph</p> <p>21 evaluate percent change for data collected</p> <p>24 use data table to record results</p> <p>25 create a mathematical model</p> <p>25 collect force data</p> <p>27 use data table to record results</p> <p>27 recognize variables</p> <p>27 find math rule for lever equilibrium</p> <p>27 write down the number of weights you use</p> <p>28 derive a math formula</p> <p>30 record ropes and pulley data in table</p> <p>30 interpret block and tackle data</p> <p>35 study data and determine importance of height on speed of marble</p> <p>36 organize data into a table</p>

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					37 organize data into a graph of speed vs. height
					45 analyze data and explain a rule
					51 graph voltage vs. current
					75 evaluate statistical significance
					75 create data table for self-designed experiment
					76 calculate % error
					121 graph mass vs. volume
					129 control the height of the liquid
					129 find average velocity
					141 build models of Na and Cl and use them to explain bonding
					146 record detailed observations
					147 organize observations into a category table
					150 record data as you perform experiment
					151 design a data table
					151 does your experiment agree with law of conservation of mass?

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
					<p>157 add new rules to list based on findings</p> <p>165 what does the word "control" mean?</p> <p>165 why was plain water tested?</p> <p>167 average dissolving rate</p> <p>167 use data table for observations</p> <p>167 evaluate method based on data</p> <p>173 organize water quality data into a table</p> <p>181 construct a graphical model</p> <p>183 construct a temperature vs. time graph</p>

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1.1.5 SCIENCE AS INQUIRY – The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry.	8 - 12	The student will demonstrate the abilities necessary to do scientific inquiry.	The student actively engages in communicating and defending the design, results, and conclusion of his/her investigation.	20	explain your reasoning	9	present conclusions to the class
				27	how to read a graph	9	reporting on an experiment
						15	discuss and test ideas with your group
						19	explain how you arrived at your answer
						29	discuss what you learned about gears
						37	describe the flow of energy based on experimental graph
						39	give a brief presentation to the class
						47	discuss an explanation with your group
						47	present and defend an explanation
						78	reading harmonic motion data tables and graphs
						129	explain your answer and justify
						145	present findings to the class
						145	present findings and methods used
						151	present results to the class

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					173 write paragraph to explain results 175 create water quality report 179 write summary of findings

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1.1.6 SCIENCE AS INQUIRY – The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry.	8 - 12	The student will demonstrate the abilities necessary to do scientific inquiry.	The student understands methods used to test hypotheses.	11 controlling variables in experiments 12 importance of reliable and accurate data collection 19 did you run a controlled experiment? 20 how will speed change? 20 what factors could explain the variability in their data? 24 predicting speed from a graph 24 making a graph 26 creating graphs 41 make a graph 42 predict the speed of a car 42 interpreting distance/time graph	4 difference between precise and accurate data 6 electronic timer and release technique 7 what variables should be controlled? 7 record time interval 9 collect speed data 13 graph distance vs. time 15 construct a quantitative graphical model 17 record times 21 construct reasonable explanation based on data 21 think about percent change 24 collect weight data 25 create a mathematical model 27 find math rule for lever equilibrium 28 derive a math formula 35 study data and determine importance of height on speed of marble 36 collect precise speed and height data

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					37 organize data into a graph of speed vs. height
					45 analyze data and explain a rule
					51 graph voltage vs. current
					75 collect mass and amplitude data
					76 use data to predict best string length for a pendulum clock
					121 use graph to predict mass of six objects
					121 graph mass vs. volume
					129 control the height of the liquid
					147 organize observations into a category table
					151 does your experiment agree with law of conservation of mass?
					151 do the data support the hypothesis
					156 make predictions about solubility
					165 what does the word "control" mean?
					165 why was plain water tested?

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					167 collect time data and record observations 167 what was happening at molecular level? 181 construct a graphical model 183 construct a temperature vs. time graph
2A.1.1 CHEMISTRY – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the structure of the atom.	The student understands atoms, the fundamental organizational unit of matter, are composed of subatomic particles, organized in a small, dense, positively charged nucleus and surrounded by a negatively charged electron cloud.	311 location/size/charge of subatomic particles 311 protons/neutrons/electrons 315 atoms of same element have same atomic number 318 proton/electron attraction 388 showing valence electrons in a diagram	132 atomic number determines what element that atom is 132 building atom models 133 location of electrons in atom 133 protons and neutrons 136 model stable and neutral atoms 137 importance of atomic number 137 build atomic models 140 find the number of electrons in outermost level 140 review subatomic particles

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2A.1.2 CHEMISTRY – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the structure of the atom.	The student understands isotopes are atoms with the same atomic number (same number of protons) but different numbers of neutrons. The nuclei of some atoms are radioactive isotopes that spontaneously decay, releasing radioactive energy.	316 isotopes explained 387 fusion and fission explained 388 nuclear vs chemical reactions	133 exploring isotopes 136 understanding isotopes 138 fusion and fission 138 nuclear reactions 160 radioactive decay 160 how do you simulate nuclear decay?
2A.2.1 CHEMISTRY – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the states and properties of matter.	The student understands chemists use kinetic and potential energy to explain the physical and chemical properties of matter on earth. Matter may exist in any of these three states: solids, liquids, and gases.	284 states of matter and arrangement of molecules 284 changes of state 285 characteristics of matter related to its state 451 temperature and kinetic energy 451 increasing temperature means increasing motion of molecules	118 observe melting process and study quantitatively 118 molecules in a liquid 118 investigate melting 119 investigate melting and create a graph 119 adding heat energy to melt an ice cube 119 create a temperature vs. time graph of phase change 119 energy and phase changes

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2A.2.2 CHEMISTRY – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the states and properties of matter.	The student understands the periodic table lists elements according to increasing atomic number. This table organizes physical and chemical trends by groups, periods, and categories.	315 atomic number discussed 316 isotopes explained 316 mass number discussed 320 groups of elements 321 groups of elements and valence shells 321 studying the periodic table 322 atomic mass on the periodic table 322 mass number on the periodic table 322 atomic number on the periodic table 322 chemical symbols and element names 329 periodic table columns and valence electrons 330 bonding and periodic table position 332 periodic table and electronegativities 332 metals nonmetals and metalloids 335 periodic table and oxidation numbers	133 using the periodic table 133 exploring isotopes 133 identify mass number 133 identify atomic number 133 identify element symbol and name 136 building and studying the periodic table 136 understanding isotopes 136 mass number 136 atomic number 141 build model of Na and Cl atoms and explain why they bond to form a molecule 142 arrangement of electrons and groups of elements

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2A.2.3 CHEMISTRY – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the states and properties of matter.	The student understands chemical bonds result when valence electrons are transferred or shared between atoms. Ionic compounds result from atoms transferring electrons. Molecular compounds result from atoms sharing electrons.	311 location/size/charge of subatomic particles 311 protons/neutrons/electrons 318 proton/electron attraction 324 use the periodic table to predict chemical formulas 324 which element is more likely to combine with other elements? 335 chemical bonding and the periodic table 388 showing valence electrons in a diagram	132 building atom models 133 location of electrons in atom 133 protons and neutrons 136 ions 136 model stable and neutral atoms 137 build atomic models 140 find the number of electrons in outermost level 140 review subatomic particles 141 when an atom ionizes 141 modeling a chemical bond 143 ionic compounds

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2A.3.1 CHEMISTRY – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will gain a basic concept of chemical reactions.	The student understands a chemical reaction occurs when one or more substances react to form a different chemical substance(s) (products). There are different types of chemical reactions all of which demonstrate the Law of Conservation of Mass	353	physical and chemical changes and digestion	146	investigate and observe chemical and physical changes in the lab
				354	chemical reactions and digestion	148	reactants and products
				354	new substances are formed when a chemical change occurs	149	balance these equations
				355	physical and chemical changes in tire recycling	149	practice balancing equations
				357	chemical reactions involve rearrangement of atoms	150	investigate conservation of mass in effervescent tablet reaction
				357	combustion reaction	152	write the balanced equation
				359	balancing chemical equations	152	predict how much product formed given the reactants
				361	heartburn reaction	156	investigate double displacement reactions
				361	chemical reactions in living systems	156	predict products in a double displacement reaction
				363	history of law of conservation of mass	158	investigate energy changes in chemical reactions
				364	formation of petroleum is a very slow chemical reaction	162	investigating combustion reactions
				371	which of the equations is balanced?		
				372	determine if changes are chemical or physical		
				375	synthesis or addition reactions		

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				377	single displacement reactions
				377	double displacement reactions
				378	consumer chemistry
				378	combustion reactions
				381	exothermic reactions and MREs
				381	MRE ration heater reaction
				382	endothermic reactions and cold packs
				395	chemistry of the atmosphere
				395	chemistry of the atmosphere
				397	carbon reactions
				444	chemical reactions and the formation of acid rain
				487	chemical reactions in living systems
				489	metabolism and stored energy

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2B.1.1 PHYSICS – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the relationships between force and motion.	The student understands Newton's Laws and the kinematic variables of time, position, velocity, and acceleration can be used to describe the position and motion of particles.	13 speed is relative 14 how to calculate speed 15 compare and contrast speed and velocity 18 what is the speed of an object that is standing still? 20 find speed of bumblebee 20 calculate speed of car 24 accurate speed measurements 25 conceptual models of motion 29 position vs. time graph discussion 30 position vs. time graphs 32 average speed vs. instantaneous 32 average speed discussed 33 understanding acceleration 35 how to calculate acceleration 36 examples of acceleration 37 speed vs. time graphs 37 speed vs. time graph discussion	8 calculating speed 9 collect data and calculate speed of car 10 calculate speed of the car 12 model the car's motion graphically 12 find speed of car at different positions 12 calculate speed of moving car 13 make a position vs. time graph 14 exploring acceleration on a ramp 14 calculate acceleration of car on ramp 14 calculate speed of car at two places on the ramp 14 acceleration is the rate at which speed changes 15 make a speed vs. time graph 15 changes in motion can be represented graphically 16 thinking about force 16 2nd law 16 unbalanced forces and acceleration of car

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				42	17
				45	19
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				45	20
				46	20
				47	20
				48	21
				48	22
				49	23
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				49	25
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				51	30
				52	

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				52	gravity depends on mass	36	find speed of marble
				53	how to calculate weight		
				53	acceleration due to gravity		
				54	Newton's law of universal gravitation		
				55	calculating gravitational force between objects		
				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		
				64	solving problems using $f=ma$		
				67	how simple machines manipulate forces		
				69	newtons and pounds		
				69	how to calculate mechanical advantage		
				70	mechanical advantage of block and tackle		
				71	pliers as an example of a lever		

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2B.1.2 PHYSICS – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the relationships between force and motion.	The student understands physicists use conservation laws to analyze the motion of objects.	60	law of conservation of momentum	38	identify potential/kinetic energy conversions
2B.2.1 PHYSICS – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the conservation of mass and energy, and the First and Second Laws of Thermodynamics.	The student understands matter has energy. Mass and energy can be interchanged. The total energy in the universe is constant, but the type of energy may vary.	88	potential and kinetic energy explained	37	investigating conservation of energy with rollercoaster
				90	conservation of energy explained	38	explore energy transformations
				91	understand basic forms of energy	38	conservation of energy and energy transformations
				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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2B.2.2 PHYSICS – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the conservation of mass and energy, and the First and Second Laws of Thermodynamics.	The student understands the first Law of Thermodynamics states the total internal energy of a substance will change only if heat is exchanged with the environment or work is done on or by the substance.	83 how to calculate work 85 some input work is converted to heat 87 concept of energy as stored work 91 understand basic forms of energy 92 where does "spent" energy go? 96 explain the "lost" energy 96 calculate work done 97 compare different amounts of work done 97 calculate work accomplished by a motor 468 densely packed solids are good conductors of heat 468 heat transfer through air 470 warming hands over candle 470 convection currents and weather 472 convection currents in water 476 solid road surface emits radiation	31 calculate work done on block 39 identify type of energy involved 119 investigate temperature and energy transfer in melting process 190 investigate conduction through all states of matter 192 investigate convection in liquids 194 investigate radiation emitted by solids 194 investigate radiation emitted by liquids

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				478 apply knowledge of heat transfer to different situations 481 global warming and heat transfer by radiation 488 work vs. calories used by the body 488 work vs. calories used by the body 491 work and mechanical systems	
2B.2.3 PHYSICS – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the conservation of mass and energy, and the First and Second Laws of Thermodynamics.	The student understands the Second Law of Thermodynamics states the entropy of a system isolated from transfer of matter and/or energy will not decrease.	84 work input and output	31 work output vs. work input

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2B.3.1 PHYSICS – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the nature of the fundamental interactions of matter and energy.	The student understands there are four fundamental forces in nature: strong nuclear force, weak nuclear force, electromagnetic force, and gravitational force.	52 gravity depends on mass 54 Newton’s law of universal gravitation 55 calculating gravitational force between objects 106 electrical force is incredibly strong! 106 electrical forces 389 electromagnetic force 389 strong nuclear force 389 forces in the nucleus	136 strong force

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2B.3.2 PHYSICS – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the nature of the fundamental interactions of matter and energy.	The student understands waves have energy and can transfer energy when they interact with matter.	195 waves transmit energy 197 transverse and longitudinal waves 201 waves and refraction 201 waves and reflection 201 reflection in water waves and light waves 201 waves and absorption 202 refraction and eyeglasses 204 resonance explained 205 standing waves on a string 206 constructive and destructive interference 210 natural frequency of a building and earthquakes 210 can wave interference sink a ship? 223 interference of sound waves 225 consonance and dissonance and beats 234 what makes light? 240 polarization of light 242 color and frequency of light waves 258 refraction in optical systems	82 study wave pulses on elastic cord 84 make different types of waves in a ripple tank 85 observing reflection in water waves 87 investigating resonance 88 natural frequency and resonance of standing waves on a string 95 investigate interference with sound waves 95 interference and sound waves 96 investigating sound resonance 100 study what makes light 101 examine light through diffraction grating 102 polarization of water waves 102 polarization of a spring wave 103 polarization of light 105 explore relationship between color and wavelength 106 tracing incident and reflected rays

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				258	forming images with lenses	107	investigate how light interacts with mirrors
				260	reflection and mirrors	107	investigate reflection of light
				261	refraction and lenses		
				263	index of refraction	107	plot reflected rays from a mirror
				263	index of refraction		
				264	human eye as an optical instrument	108	explore refraction with lenses
				273	find the angle of reflection	108	tracing incident and refracted rays
				474	energy and radiation relationships	108	explore refraction with a prism
				476	absorption and emission	108	investigate how light interacts with a prism
						110	finding focal point and focal length of a lens
						111	plotting images formed when light is refracted by a lens

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2B.3.3 PHYSICS – The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	8 - 12	The student will understand the nature of the fundamental interactions of matter and energy.	The student understands electromagnetic waves result when a charged particle is accelerated or decelerated.	102	concept of electric circuits	42	investigate electric charge
				103	circuit diagrams	45	battery chemicals and electrical charge
				105	charge is a fundamental property of matter	56	build a parallel circuit
				106	static charge discussed	56	build a series circuit
				107	explanation of coulomb	58	build a series circuit and find total resistance
				108	how an electroscope works	60	parallel circuit and Ohm's law
				108	electroscopes	66	build an electromagnet
				113	battery uses chemical energy to produce electrical charge	67	find out what happens to strength of electromagnet when current is increased
				114	voltage is related to potential energy	100	study what makes light
				145	series circuit defined		
				145	parallel circuit defined		
				146	household wiring		
				147	current and voltage in series circuits		
				151	voltage and resistance in parallel circuits		
				155	analyze a parallel circuit		
				156	analyze a series circuit		
				164	what is an electromagnet?		
				166	increased current vs. strength of magnetic field		

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				166 building an electromagnet 196 waves are all around us 234 what makes light? 237 microwave ovens 237 radio and television signals 250 identify uses of electromagnetic waves 272 identify uses of electromagnetic waves 474 ultraviolet and infrared light	
5.1.1 SCIENCE AND TECHNOLOGY – The student will develop understandings about the relationship between science and technology.	8 - 12	The student will develop an understanding that technology is applied science.	The student understands technology is the application of scientific knowledge for functional purposes.	73 relationship between science and technology	70 using engineering design cycle

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5.1.2 SCIENCE AND TECHNOLOGY – The student will develop understandings about the relationship between science and technology.	8 - 12	The student will develop an understanding that technology is applied science.	The student understands creativity, imagination, and a broad scientific knowledge base are required to produce useful results.	34 Aristotle vs. Newton 45 Newton’s Laws of Motion 54 Newton and the force of gravity 105 Benjamin Franklin 107 Charles-Augustin Coulomb 312 contributions of Fermi 313 development of atomic theory 321 contributions of Mendeleev 324 research and create a poster to illustrate development of atomic model 393 contributions of Marie and Pierre Curie	130 investigate Rutherford’s gold foil experiment
5.1.3 SCIENCE AND TECHNOLOGY – The student will develop understandings about the relationship between science and technology.	8 - 12	The student will develop an understanding that technology is applied science.	The student understands science advances new technologies. New technologies open new areas for scientific inquiry.	73 relationship between science and technology	70 using engineering design cycle

Correlation to Kansas Science Education Standards (draft 2d)
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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
6.1.1 SCIENCE IN PERSONAL AND ENVIRONMENTAL PERSPECTIVES – The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality...	8 - 12	The student will develop an understanding of the overall functioning of human systems and their interaction with the environment in order to understand specific mechanisms and processes related to health issues.	The student understands some chemical and physical hazards and accidents can be avoided through safety education.		20 safety tip for car/ramp setup 24 ropes and pulley safety 26 safety tip for hanging weights from lever 40 electrical safety 44 short circuit safety warning 56 short circuit safety warning 58 short circuit safety warning 146 safety in the lab 150 chemistry safety 158 wear goggles and apron 164 safety equipment 168 hot water safety 172 safety tip for water testing 180 thermometer safety 182 heat safety 186 thermometer safety 192 heat safety 198 heat safety 200 safely using rubber bands

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page		Volume 2 Investigation Manual page	
6.1.3 SCIENCE IN PERSONAL AND ENVIRONMENTAL PERSPECTIVE S – The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality...	8 - 12	The student will develop an understanding of the overall functioning of human systems and their interaction with the environment in order to understand specific mechanisms and processes related to health issues.	The student understands informed personal choices concerning fitness and health involve an understanding of chemistry and biology.	354	chemical reactions and digestion	162	structure of fossil fuels
				394	photosynthesis and carbon reactions	162	importance of fossil fuels
				395	fossil fuels and carbon reactions		
				487	simple sugars are transported to cells		
				487	biomolecules and energy		
				488	fats proteins and carbohydrates		
				489	metabolism and stored energy		

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
6.3.1 SCIENCE IN PERSONAL AND ENVIRONMENTAL PERSPECTIVES – The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality...	8 - 12	The student will understand that human populations use natural resources and influence environmental quality.	The student understands natural resources from the lithosphere and ecosystems are required to sustain human populations.	394 photosynthesis and carbon reactions 395 fossil fuels and carbon reactions 487 simple sugars are transported to cells 487 biomolecules and energy 488 fats proteins and carbohydrates	162 structure of fossil fuels 162 importance of fossil fuels

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page		Volume 2 Investigation Manual page	
6.3.2 SCIENCE IN PERSONAL AND ENVIRONMENTAL PERSPECTIVES – The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality...	8 - 12	The student will understand that human populations use natural resources and influence environmental quality.	The student understands Earth does not have infinite resources.	421 430	wise use of water water usage and quality	163 172 174	can trees compensate for manmade CO2 from vehicles and industry? perform water quality tests wise use of water supply

Correlation to Kansas Science Education Standards (draft 2d)
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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
6.4.1 SCIENCE IN PERSONAL AND ENVIRONMENTAL PERSPECTIVES – The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality...	8 - 12	The student will understand the effect of natural and human-influenced hazards.	The student understands natural processes of earth may be hazardous for humans.	387 fusion and fission explained 388 nuclear vs chemical reactions 444 acid rain explained 448 research the issue of acid rain	138 fusion and fission 138 nuclear reactions 160 radioactive decay 160 how do you simulate nuclear decay? 178 investigate effect of acid rain on microorganisms

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
6.4.2 SCIENCE IN PERSONAL AND ENVIRONMENTAL PERSPECTIVES – The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality...	8 - 12	The student will understand the effect of natural and human-influenced hazards.	The student understands there is a need to assess potential risk and danger from natural and human-induced hazards	379 hydrogen-powered cars and the environment 395 fossil fuels 444 acid rain explained 448 research the issue of acid rain	20 safety tip for car/ramp setup 24 ropes and pulley safety 26 safety tip for hanging weights from lever 40 electrical safety 44 short circuit safety warning 56 short circuit safety warning 58 short circuit safety warning 146 safety in the lab 150 chemistry safety 158 wear goggles and apron 160 radioactive decay 163 too much CO2 164 safety equipment 168 hot water safety 172 safety tip for water testing 178 investigate effect of acid rain on microorganisms 180 thermometer safety 182 heat safety 186 thermometer safety 192 heat safety 198 heat safety

Correlation to Kansas Science Education Standards (draft 2d)
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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
					200 safely using rubber bands
6.5.1 SCIENCE IN PERSONAL AND ENVIRONMENT AL PERSPECTIVE S – The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality...	8 - 12	The student will develop an understanding of the relationship between science, technology, and society.	The student understands progress in science and technology can be affected by social issues and challenges. Science and technology indicate what can happen, not what should happen.	73 relationship between science and technology 320 the quests of alchemists 391 scientific discovery and the atomic age	70 using engineering design cycle
7.1.1 HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	8 - 12	The student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe.	The student demonstrates an understanding of science as both vocation and avocation.	214 ultrasound technology 220 voice recognition technology 294 invention of Kevlar	174 water quality testing 177 chemistry and photography

Correlation to Kansas Science Education Standards (draft 2d)
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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page		Volume 2 Investigation Manual page	
7.1.2 HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	8 - 12	The student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe.	The student explains how science uses peer review, replication of methods, and norms of honesty.	20 24 42	how will speed change? predicting speed from a graph predict the speed of a car	11 76 76 121 151 156	calculate % error use data to predict best string length for a pendulum clock calculate % error use graph to predict mass of six objects does your experiment agree with law of conservation of mass? make predictions about solubility
7.1.3 HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	8 - 12	The student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe.	The student recognizes the universality of basic science concepts and the influence of personal and cultural beliefs that embed science in society.	34 73 73 320 391	Newton’s research impacted mathematics impact of technology impact of Da Vinci’s work the quests of alchemists scientific discovery and the atomic age	163	evaluating choice of favorite car

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page		Volume 2 Investigation Manual page	
7.1.4 HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	8 - 12	The student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe.	The student recognizes that society helps create the ways of thinking required for scientific advances, both toward training scientists and educating a populace to utilize benefits of science.	58 73 78 120 320 391	Newton on a skateboard impact of Da Vinci’s work describe a problem that would be solved by an engineer circuits in your house the quests of alchemists scientific discovery and the atomic age	39	study energy transformations in daily life scenarios
7.1.5 HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	8 - 12	The student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe.	The student understands there are many issues which involve morals, ethics, values or spiritual beliefs that go beyond what science can explain, but for which solid scientific literacy is useful.	320 391	the quests of alchemists scientific discovery and the atomic age	163	evaluating choice of favorite car

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
7.1.6 HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	8 - 12	The student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe.	The student recognizes society's role in supporting topics of research and determining institutions where research is conducted.	34 73 73	Newton's research impacted mathematics impact of technology impact of Da Vinci's work
7.2.1 HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	8 - 12	The student will develop an understanding of the nature of scientific knowledge.	The student understands scientific knowledge describes and explains the natural world.		6 asking questions and learning about natural world

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
7.2.2 HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	8 - 12	The student will develop an understanding of the nature of scientific knowledge.	The student understands scientific knowledge begins with empirical observations, which are the data upon which further scientific knowledge is built.	5 measuring distance 42 analyze a speed/distance graph 372 observe chemical changes	5 measuring metric and english lengths 6 measure time 6 compare results with other groups 11 analyze speed change of car 11 graph speed vs. position 14 record three different time intervals 16 measure force 18 study data table for relationship between force and motion 25 analyze block and tackle data 25 collect force data 27 analyze lever equilibrium data 27 write down the number of weights you use 35 does data support hypothesis? 44 measure voltage 45 did battery voltage change? 46 measure current

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
					48 measure resistance 76 analyze pendulum data 87 measure wavelength 100 observe glow-in-the-dark paper 116 measure mass 117 measure volume 146 record detailed observations 146 observe evidence of chemical change 147 students analyze chemical change lab results 150 record data as you perform experiment 158 observe temperature changes in chemical reactions 164 observe Tyndall effect 168 observe dissolving process 175 make observations about local surface water 180 measure temperature 192 observe convection currents

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
7.2.3 HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	8 - 12	The student will develop an understanding of the nature of scientific knowledge.	The student understands scientific knowledge consists of hypotheses, inferences, laws, and theories.	9 steps in the scientific method 10 forming a hypothesis 10 process of reviewing hypothesis explained 19 design your own experiment	6 formulate hypothesis 6 predict which car will move fastest 7 test the effect of one other variable 7 compare results with hypothesis 9 devise a hypothesis 27 think about the variables 34 formulate hypothesis 34 where does the marble move the fastest? 39 review energy theory in context of everyday scenarios 43 how did A and B tapes acquire different charge? 75 investigate variables that affect the period of a pendulum 75 plan three experiments to determine which variable affects the period of a pendulum 151 review your hypothesis 151 perform the experiment you designed 151 explain how hypothesis compares to results

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
					<p>166 which method will give fastest dissolving rate?</p> <p>166 which factor will produce fastest dissolving rate?</p> <p>166 devise hypothesis and explain</p> <p>167 did you prove or disprove your hypothesis?</p> <p>178 formulate hypothesis</p> <p>198 formulate hypothesis</p> <p>198 which type of food contains the most energy?</p>

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page		
7.2.4 HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	8 - 12	The student will develop an understanding of the nature of scientific knowledge.	The student understands a testable hypothesis or inference must be subject to confirmation by empirical evidence.	5 12 42	measuring distance importance of reliable and accurate data collection analyze a speed/distance graph	4 4 5 6 6 6 7 9 11 11 14 16 17 18 24 25 25 27	difference between precise and accurate data measuring metric and english lengths compare results with other groups electronic timer and release technique measure time record time interval collect speed data graph speed vs. position analyze speed change of car record three different time intervals measure force record times study data table for relationship between force and motion collect weight data collect force data analyze block and tackle data analyze lever equilibrium data

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
					<p>27 write down the number of weights you use</p> <p>35 does data support hypothesis?</p> <p>36 collect precise speed and height data</p> <p>44 measure voltage</p> <p>45 did battery voltage change?</p> <p>46 measure current</p> <p>48 measure resistance</p> <p>75 collect mass and amplitude data</p> <p>76 analyze pendulum data</p> <p>87 measure wavelength</p> <p>116 measure mass</p> <p>117 measure volume</p> <p>146 record detailed observations</p> <p>147 students analyze chemical change lab results</p> <p>150 record data as you perform experiment</p> <p>151 do the data support the hypothesis</p>

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
					<p>167 what was happening at molecular level?</p> <p>167 collect time data and record observations</p> <p>180 measure temperature</p>

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7.3.1 HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	8 - 12	The student will understand science from historical perspectives.	The student demonstrates an understanding of the history of science.	34	Newton and the history of physics	130 investigate Rutherford's gold foil experiment
				34	Aristotle vs. Newton	
				45	Newton's discovery of the 2nd law	
				45	Newton's Laws of Motion	
				45	Newton's Principia	
				46	oldest known standard weight	
				54	Newton and the force of gravity	
				55	Newton and the apple legend	
				73	Leonardo DaVinci	
				86	James Watt	
				105	Benjamin Franklin	
				107	Charles-Augustin Coulomb	
				115	Volta's batteries	
				131	Georg Ohm's work with circuits	
				134	history of superconductivity	
				160	Faraday's contributions	
				161	history of magnetism	
312	Dalton's contributions					

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Standard #: Standard	Grade Level	Benchmark	Indicator	Volume 1 Student Text page	Volume 2 Investigation Manual page
				312	contributions of Fermi
				312	history of atomic theory
				313	development of atomic theory
				321	contributions of Mendeleev
				321	Mendeleev's periodic table
				324	research and create a poster to illustrate development of atomic model
				332	Linus Pauling and electronegativities
				343	Avogadro's number
				363	history of law of conservation of mass
				363	Antoine Lavoisier
				393	accomplishments of Marie Curie
				393	Marie and Pierre Curie
				393	contributions of Marie and Pierre Curie
				393	history of nuclear chemistry
				456	contributions of Joule