

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
I.01.01 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Develop and clarify questions and hypotheses that guide scientific investigations.	7 experimentation begins with a question 9 steps in the scientific method 10 forming a hypothesis 10 the research question and hypothesis 19 design your own experiment 19 design your own experiment 42 devise an experiment	6 formulate hypothesis 6 predict which car will move fastest 6 how do we ask questions and get answers from nature? 7 perform your own experiment 7 test the effect of one other variable 7 compare results with hypothesis 7 design your own experiment 9 design three experiments using car and ramp 9 devise a hypothesis 10 conduct car/ramp experiment 16 investigate Newton's 2nd law 16 decide how to vary the force on the car for this experiment 26 what variables can be changed? 27 think about the variables 34 formulate hypothesis

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
					<p>34 investigate motion on a rollercoaster</p> <p>34 where does the marble move the fastest?</p> <p>43 how did A and B tapes acquire different charge?</p> <p>75 plan three experiments to determine which variable affects the period of a pendulum</p> <p>75 perform self-designed experiment</p> <p>75 investigate variables that affect the period of a pendulum</p> <p>75 design pendulum experiment</p> <p>93 decision trees and the advantage of doing multiple trials</p> <p>151 perform the experiment you designed</p> <p>151 explain how hypothesis compares to results</p> <p>151 design experiment to find out if mass is conserved</p> <p>166 which method will give fastest dissolving rate?</p> <p>166 devise hypothesis and explain</p>

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
					<p>166 what three factors influence dissolving rate?</p> <p>166 which factor will produce fastest dissolving rate?</p> <p>178 formulate hypothesis</p> <p>198 which type of food contains the most energy?</p> <p>198 formulate hypothesis</p>

**Correlation to Hawaii Content and Performance Standards III  
 Foundations of Physical Science Student Text and Investigation Manual**

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I.01.02 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Design and conduct scientific investigations to test hypotheses.	7 experimentation begins with a question 9 steps in the scientific method 10 forming a hypothesis 19 design your own experiment 19 design your own experiment 42 devise an experiment 288 find the thickness of a single card	7 perform your own experiment 7 compare results with hypothesis 7 design your own experiment 9 design three experiments using car and ramp 9 design three experiments and choose technology 9 design three experiments and choose equipment 9 conduct three experiments with appropriate equipment 10 selecting ramp and photogates 10 conduct car/ramp experiment 12 select equipment and set up experiment 16 decide how to vary the force on the car for this experiment 16 investigate Newton's 2nd law 26 what variables can be changed? 30 rigging block and tackle

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
					<p>34 investigate motion on a rollercoaster</p> <p>40 choose circuit parts to light a bulb</p> <p>75 perform self-designed experiment</p> <p>75 design pendulum 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 plan a procedure and select necessary equipment</p> <p>145 carry out procedure and select equipment</p> <p>151 design experiment to find out if mass is conserved</p> <p>151 plan procedures and select materials</p> <p>151 select materials from list</p> <p>166 what three factors influence dissolving rate?</p> <p>166 which factor will produce fastest dissolving rate?</p>

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
					174 visit local water supply and perform testing

**Correlation to Hawaii Content and Performance Standards III  
 Foundations of Physical Science Student Text and Investigation Manual**

<b>Standard #: Strand</b>	<b>Content Standard</b>	<b>Grade Level</b>	<b>Benchmark</b>	<b>Volume 1 Student Text page</b>		<b>Volume 2 Investigation Manual page</b>
I.01.03 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Organize, analyze, validate and display data/information in ways appropriate to scientific investigations, using technology and mathematics.	24	making a graph	data tables and graphs can be created on computer or graphing calculator
				26	creating graphs	
				41	make a graph	
				42	interpreting distance/time graph	6 compare results with other groups
				42	analyze a speed/distance graph	9 construct a data table
						11 graph speed vs. position
						11 calculate % error
						11 analyze speed change of car
						12 understand and use data table
						13 graph distance vs. time
						15 construct a quantitative graphical model
						17 record results in data table
						18 study data table for relationship between force and motion
						18 organize different combinations of data
						21 think about percent change
						24 use data table to record results
						25 create a mathematical model

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
					25 analyze block and tackle data
					27 use data table to record results
					27 analyze lever equilibrium data
					27 find math rule for lever equilibrium
					28 derive a math formula
					30 record ropes and pulley data in table
					35 does data support hypothesis?
					36 organize data into a table
					37 organize data into a graph of speed vs. height
					45 did battery voltage change?
					51 graph voltage vs. current
					75 create data table for self-designed experiment
					76 analyze pendulum data
					76 calculate % error
					121 graph mass vs. volume
					129 find average velocity
					147 organize observations into a category table

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
					<p>147 students analyze chemical change lab results</p> <p>151 does your experiment agree with law of conservation of mass?</p> <p>151 design a data table</p> <p>167 use data table for observations</p> <p>167 average dissolving rate</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>

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
I.01.04 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Formulate scientific explanations and conclusions and models using logic and evidence.	24 making a graph 24 interpretations of patterns in data 26 creating graphs 27 reading a graph 41 make a graph 42 interpreting distance/time graph 78 analyze lever diagram	13 graph distance vs. time 15 interpret a speed vs. time graph 15 construct a quantitative graphical model 21 construct reasonable explanation based on data 21 think about percent change 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 37 organize data into a graph of speed vs. height 45 analyze data and explain a rule 51 graph voltage vs. current 121 graph mass vs. volume 147 organize observations into a category table 151 does your experiment agree with law of conservation of mass?

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

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					181 construct a graphical model 183 construct a temperature vs. time graph
I.01.05 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Communicate and defend scientific explanations and conclusions.	20 explain your reasoning	9 present conclusions to the class 9 reporting on an experiment 37 describe the flow of energy based on experimental graph 39 give a brief presentation to the class 47 present and defend an explanation 145 present findings and methods used 145 present findings to the class 151 present results to the class 173 write paragraph to explain results 175 create water quality report 179 write summary of findings

**Correlation to Hawaii Content and Performance Standards III**  
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I.01.06 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Identify and analyze alternative explanations and conclusions and models.	20	finding variability in data	6	predict which car will move fastest
				79	look at force data and decide the usefulness of a machine	7	test the effect of one other variable
						18	use data to describe relationship between force and motion
						19	use data to infer correct relationship between variables
						27	think about the variables
						30	interpret block and tackle data
						34	where does the marble move the fastest?
						39	analyze energy transformations in different scenarios
						43	how did A and B tapes acquire different charge?
						75	investigate variables that affect the period of a pendulum
						77	compare law of conservation of energy to motion of pendulum
						141	build models of Na and Cl and use them to explain bonding

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

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					151 explain how hypothesis compares to results 151 perform the experiment you designed 151 do the data support the hypothesis 167 what was happening at molecular level?
I.01.07 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Revise scientific explanations and conclusions based on additional information/data gathered.		157 add new rules to list based on findings

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

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I.02.01 Habits of Mind	Living the Values, Attitudes, and Commitments of the Inquiring Mind	9 - 12	Report findings accurately without alterations and draw conclusions from unaltered findings.	20	how will speed change?	students are encouraged to keep a lab notebook
				24	predicting speed from a graph	9 construct a data table
				42	predict the speed of a car	9 reporting on an experiment
						12 understand and use data table
						14 record three different time intervals
						17 record results in data table
						18 organize different combinations of data
						21 construct reasonable explanation based on data
						24 use data table to record results
						25 collect force data
						27 use data table to record results
						27 write down the number of weights you use
						30 record ropes and pulley data in table
						35 study data and determine importance of height on speed of marble
						36 organize data into a table

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
					<p>45 analyze data and explain a rule</p> <p>75 create data table for self-designed experiment</p> <p>76 use data to predict best string length for a pendulum clock</p> <p>121 use graph to predict mass of six objects</p> <p>146 record detailed observations</p> <p>150 record data as you perform experiment</p> <p>151 design a data table</p> <p>156 make predictions about solubility</p> <p>167 use data table for observations</p> <p>173 organize water quality data into a table</p> <p>173 write paragraph to explain results</p> <p>175 create water quality report</p> <p>179 write summary of findings</p>

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

<b>Standard #: Strand</b>	<b>Content Standard</b>	<b>Grade Level</b>	<b>Benchmark</b>	<b>Volume 1 Student Text page</b>		<b>Volume 2 Investigation Manual page</b>	
I.02.02 Habits of Mind	Living the Values, Attitudes, and Commitments of the Inquiring Mind	9 - 12	Acknowledge references, contributions, and work done by others.	400	research the Clean Air Act of 1970 and 1990	173	write paragraph to explain results
				434	research local water supply history	175	create water quality report
				464	research the history of heat and temperature	177	research pH indicators
						179	write summary of findings
						201	research electricity generation

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

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I.02.03 Habits of Mind	Living the Values, Attitudes, and Commitments of the Inquiring Mind	9 - 12	Evaluate the logic and validity of evidence, conclusions, and explanations against current scientific knowledge.	19	which group did the best experiment?	13	graph distance vs. time
				24	making a graph	15	construct a quantitative graphical model
				26	creating graphs	18	evaluate graphs as to whether or not they show relationships between variables
				41	make a graph	21	evaluate percent change for data collected
						37	organize data into a graph of speed vs. height
						39	analyze energy transformations in different scenarios
						51	graph voltage vs. current
						75	evaluate statistical significance
						77	compare law of conservation of energy to motion of pendulum
						121	graph mass vs. volume
						147	organize observations into a category table
						151	do the data support the hypothesis
						151	does your experiment agree with law of conservation of mass?

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
					167 what was happening at molecular level? 167 evaluate method based on data 181 construct a graphical model 183 construct a temperature vs. time graph
I.02.04 Habits of Mind	Living the Values, Attitudes, and Commitments of the Inquiring Mind	9 - 12	Evaluate various perspectives and their implications before drawing conclusions.	10 process of reviewing hypothesis explained	39 review energy theory in context of everyday scenarios 151 review your hypothesis 167 did you prove or disprove your hypothesis?
I.02.05 Habits of Mind	Living the Values, Attitudes, and Commitments of the Inquiring Mind	9 - 12	When appropriate, modify ideas, explanations, and hypotheses, based on empirical data or evidence.		71 testing a motor for performance 151 does your experiment agree with law of conservation of mass? 157 add new rules to list based on findings
I.02.06 Habits of Mind	Living the Values, Attitudes, and Commitments of the Inquiring Mind	9 - 12	Ask questions to clarify or validate purpose, perspective, assumptions, interpretations, and implications of a problem, situation, or solution.	10 the research question and hypothesis	6 how do we ask questions and get answers from nature?

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
I.02.07 Habits of Mind	Living the Values, Attitudes, and Commitments of the Inquiring Mind	9 - 12	Use research techniques and a variety of resources to complete a report on a project of one's choice.	110 research Franklin's electricity experiments 370 research Lavoisier's contributions 400 research the Clean Air Act of 1970 and 1990 434 research local water supply history 464 research the history of heat and temperature	9 reporting on an experiment 173 write paragraph to explain results 175 create water quality report 177 research pH indicators 179 write summary of findings 201 research electricity generation
I.02.08 Habits of Mind	Living the Values, Attitudes, and Commitments of the Inquiring Mind	9 - 12	Ask questions, explain, and elaborate how science is a way of thinking and knowing the world around us.		6 asking questions and learning about natural world
I.03.01 Habits of Mind	Using Unifying Concepts and Themes	9 - 12	Explain the function of a given system and its relationship to other systems in the natural world.	80 form and function of wheelbarrow sailboat human jaw	68 form and function of different electric motor configurations 108 form and function of human eye, prism, and lenses
I.03.02 Habits of Mind	Using Unifying Concepts and Themes	9 - 12	Explain the effect of large and small disturbances on systems in the natural world.	51 what is equilibrium? 59 equilibrium/action reaction 164 electromagnets reverse current and switch polarity 261 change in optical systems	87 changing frequency in standing waves

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I.03.03 Habits of Mind	Using Unifying Concepts and Themes	9 - 12	Report how large changes in scale typically change the way things work in physical, biological, or social systems.	23	why make models?		
				24	scientific models		
				24	what is a scientific model?		
I.03.04 Habits of Mind	Using Unifying Concepts and Themes	9 - 12	Design or create a model to represent a device, a plan, an equation, or a mental image.	23	why make models?	13	graph distance vs. time
				24	scientific models	15	construct a quantitative graphical model
				24	what is a scientific model?	25	create a mathematical model
				24	making a graph		
				26	creating graphs	27	find math rule for lever equilibrium
				41	make a graph		
				42	interpreting distance/time graph	28	derive a math formula
						37	organize data into a graph of speed vs. height
						51	graph voltage vs. current
						121	graph mass vs. volume
						147	organize observations into a category table
						181	construct a graphical model
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**Foundations of Physical Science Student Text and Investigation Manual**

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I.04.01 Safety	Doing Safety	9 - 12	Apply school, classroom, laboratory, and field trip rules, as appropriate, to maintain a safe learning environment.	120	ground fault circuit interrupter	20	safety tip for car/ramp setup
				128	find and investigate circuit breakers in the home	24	ropes and pulley safety
				500	safety rules described	26	safety tip for hanging weights from lever
				501	safety quiz	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
						175	safety tip for testing local surface water
						180	thermometer safety
						182	heat safety
						186	thermometer safety
						192	heat safety
						198	heat safety
						200	safely using rubber bands

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

<b>Standard #: Strand</b>	<b>Content Standard</b>	<b>Grade Level</b>	<b>Benchmark</b>	<b>Volume 1 Student Text page</b>		<b>Volume 2 Investigation Manual page</b>	
I.04.02 Safety	Doing Safety	9 - 12	Identify potentially unsafe conditions prior to the activity and explain how accidents can be prevented.	120	ground fault circuit interrupter	20	safety tip for car/ramp setup
				128	find and investigate circuit breakers in the home	24	ropes and pulley safety
				500	safety rules described	26	safety tip for hanging weights from lever
				501	safety quiz	40	electrical safety
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**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

<b>Standard #: Strand</b>	<b>Content Standard</b>	<b>Grade Level</b>	<b>Benchmark</b>	<b>Volume 1 Student Text page</b>		<b>Volume 2 Investigation Manual page</b>	
I.04.03 Safety	Doing Safety	9 - 12	Follow most recent protocols established by the International Science and Engineering Fair when conducting any investigations on living and non-living organisms and under teacher/mentor supervision.	120	ground fault circuit interrupter	20	safety tip for car/ramp setup
				128	find and investigate circuit breakers in the home	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
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***Foundations of Physical Science* Student Text and Investigation Manual**

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I.04.04 Safety	Doing Safety	9 - 12	Operate emergency equipment, such as eyewash, shower, and fire blanket when needed.	featured throughout CPO Science program 500 safety rules described 501 safety quiz 501 safety quiz	featured throughout CPO Science program
I.04.05 Safety	Doing Safety	9 - 12	Assist teacher as requested in case of emergency.	featured throughout CPO Science program 500 safety rules described 501 safety quiz 501 safety quiz	featured throughout CPO Science program

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

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I.04.06 Safety	Doing Safety	9 - 12	Document and apply appropriate safety protocols when conducting scientific activities in and out of the classroom.	120	ground fault circuit interrupter	20	safety tip for car/ramp setup
				128	find and investigate circuit breakers in the home	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
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**Correlation to Hawaii Content and Performance Standards III**  
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<b>Standard #: Strand</b>	<b>Content Standard</b>	<b>Grade Level</b>	<b>Benchmark</b>	<b>Volume 1 Student Text page</b>		<b>Volume 2 Investigation Manual page</b>	
I.05.01 Science and Technology in Society	Relating the Nature of Technology to Science	9 - 12	Identify and explain current issues or problems based on evidence found in available information.	110	study appliance labels and instructions	76	analyze watch manufacturer's claims
				142	create pamphlet on utility's energy saver programs	162	inferences from promotional materials for vehicles
				434	study claims made by bottled water companies	173	study water filtration device claims

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<b>Standard #: Strand</b>	<b>Content Standard</b>	<b>Grade Level</b>	<b>Benchmark</b>		<b>Volume 1 Student Text page</b>	<b>Volume 2 Investigation Manual page</b>
I.05.02 Science and Technology in Society	Relating the Nature of Technology to Science	9 - 12	Collect, organize, and analyze information from reliable sources to identify alternative solutions.	12	importance of reliable and accurate data collection	4 difference between precise and accurate data 6 electronic timer and release technique 7 record time interval 9 collect speed data 14 record three different time intervals 17 record times 24 collect weight data 25 collect force data 27 write down the number of weights you use 36 collect precise speed and height data 75 collect mass and amplitude data 129 find average velocity 146 record detailed observations 150 record data as you perform experiment 167 collect time data and record observations 167 average dissolving rate

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

<b>Standard #: Strand</b>	<b>Content Standard</b>	<b>Grade Level</b>	<b>Benchmark</b>	<b>Volume 1 Student Text page</b>		<b>Volume 2 Investigation Manual page</b>	
I.05.03 Science and Technology in Society	Relating the Nature of Technology to Science	9 - 12	Evaluate alternative solutions for effectiveness based on appropriate criteria.	24	making a graph	13	graph distance vs. time
				26	creating graphs	15	construct a quantitative graphical model
				41	make a graph	37	organize data into a graph of speed vs. height
						51	graph voltage vs. current
						121	graph mass vs. volume
						147	organize observations into a category table
						151	does your experiment agree with law of conservation of mass?
						181	construct a graphical model
						183	construct a temperature vs. time graph
I.05.04 Science and Technology in Society	Relating the Nature of Technology to Science	9 - 12	Predict consequences or implications of proposed decisions and related actions.	20	how will speed change?	76	use data to predict best string length for a pendulum clock
				24	predicting speed from a graph	121	use graph to predict mass of six objects
				42	predict the speed of a car	156	make predictions about solubility

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

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I.05.05 Science and Technology in Society	Relating the Nature of Technology to Science	9 - 12	Select and carry out actions for the alternative solution selected.	7	experimentation begins with a question	7	perform your own experiment
				9	steps in the scientific method	7	compare results with hypothesis
				10	forming a hypothesis	7	design your own experiment
				19	design your own experiment	9	design three experiments using car and ramp
				19	design your own experiment	9	design three experiments and choose technology
				42	devise an experiment	9	design three experiments and choose equipment
				288	find the thickness of a single card	9	conduct three experiments with appropriate equipment
						10	selecting ramp and photogates
						10	conduct car/ramp experiment
						12	select equipment and set up experiment
		16	decide how to vary the force on the car for this experiment				
		16	investigate Newton's 2nd law				
		26	what variables can be changed?				
		30	rigging block and tackle				

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

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**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

<b>Standard #: Strand</b>	<b>Content Standard</b>	<b>Grade Level</b>	<b>Benchmark</b>	<b>Volume 1 Student Text page</b>	<b>Volume 2 Investigation Manual page</b>
					174 visit local water supply and perform testing
I.05.06 Science and Technology in Society	Relating the Nature of Technology to Science	9 - 12	Evaluate the effectiveness of the actions taken to resolve the problem or issue and its overall effect on self, others, and the environment.	19 which group did the best experiment?	18 evaluate graphs as to whether or not they show relationships between variables 21 evaluate percent change for data collected 75 evaluate statistical significance 167 evaluate method based on data

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

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II.01.01 Historical Perspectives	Understanding Scientific Inquiry and the Character of Scientific Knowledge	9 - 12	Critique a scientific investigation for logic and validity based on evidence.	7	experimentation begins with a question	7	variables in an experiment
				19	design your own experiment	7	design your own experiment
				42	devise an experiment	9	design three experiments using car and ramp
						16	decide how to vary the force on the car for this experiment
						26	what variables can be changed?
						35	what evidence is there in support of your hypothesis?
						39	critique group's explanation of energy transformations
						75	design pendulum experiment
						77	show how energy loss data could be applied to designing a real clock
						93	decision trees and the advantage of doing multiple trials
						151	design experiment to find out if mass is conserved
						166	what three factors influence dissolving rate?

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

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II.01.02 Historical Perspectives	Understanding Scientific Inquiry and the Character of Scientific Knowledge	9 - 12	Examine and elaborate how ethics and integrity play important roles in scientific research.	312	contributions of Fermi	130	investigate Rutherford's gold foil experiment
				313	development of atomic theory	163	evaluating choice of favorite car
				324	research and create a poster to illustrate development of atomic model		
				393	contributions of Marie and Pierre Curie		
				400	research the Clean Air Act of 1970 and 1990		
				434	research local water supply history		
				464	research the history of heat and temperature		
II.01.03 Historical Perspectives	Understanding Scientific Inquiry and the Character of Scientific Knowledge	9 - 12	Explain how scientists prevent biases in research.	73	impact of Da Vinci's work	163	evaluating choice of favorite car
				320	the quests of alchemists		
				391	scientific discovery and the atomic age		
II.01.04 Historical Perspectives	Understanding Scientific Inquiry and the Character of Scientific Knowledge	9 - 12	Compare and contrast the different science disciplines in terms of areas of study, techniques used, outcomes sought, purpose and philosophy.	58	Newton on a skateboard	39	study energy transformations in daily life scenarios
				78	describe a problem that would be solved by an engineer	174	water quality testing
				120	circuits in your house	177	chemistry and photography

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

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II.01.05 Historical Perspectives	Understanding Scientific Inquiry and the Character of Scientific Knowledge	9 - 12	Generalize that the human need to satisfy curiosity results in scientific knowledge and expanded ideas about the world.	58	Newton on a skateboard	6	asking questions and learning about natural world
				78	describe a problem that would be solved by an engineer	39	study energy transformations in daily life scenarios
				120	circuits in your house		
				312	contributions of Fermi		
				321	contributions of Mendeleev		
				393	contributions of Marie and Pierre Curie		

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
II.02.01 Historical Perspectives	Interdependence of Science, Technology, and Society	9 - 12	Analyze, conclude, and defend how technology and science impacted the social, cultural, legal, political, economic, and / or ecological systems locally or globally and vice versa.	368 limiting reactants 379 research fuel cells 379 research environmental impact of fuel cells 379 research fuel cells 379 hydrogen-powered cars and the environment 379 research economic impact of fuel cells 391 impact of nuclear energy 391 nuclear vs. fossil fuels 395 fossil fuels 400 economic impact of pollution 400 clean air act of 1970 400 problems caused by airborne pollutants 400 reducing pollution 400 economic impact of reducing air pollution 444 impact of using fossil fuels 448 research economic impact of producing gases that cause acid rain	52 the cost of using electrical appliances 163 economic impact of end- product of combustion reaction 163 too much CO2 163 research how trees offset accumulation of CO2

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

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II.02.02 Historical Perspectives	Interdependence of Science, Technology, and Society	9 - 12	Analyze and evaluate the uses and impact of technologies locally and / or globally and propose possible solutions to address negative issues.	333	problems with disposing of plastics	163	consider a vehicle's fuel economy
				355	recycling tires	163	research how trees offset accumulation of CO2
				356	recycling discarded tires	163	can trees compensate for manmade CO2 from vehicles and industry?
				364	petroleum	172	save water for houseplants
				379	research fuel cells	172	perform water quality tests
				379	research environmental impact of fuel cells	174	wise use of water supply
				392	storage of nuclear waste	175	maintaining water supply quality
				400	problems caused by airborne pollutants		
				421	wise use of water		
				425	water cycle and conservation		
430	water usage and quality						
II.02.03 Historical Perspectives	Interdependence of Science, Technology, and Society	9 - 12	Analyze and evaluate the benefits, drawbacks, and trade- offs of issues raised by the application of biotechnology in the health field (i.e., moral, ethical, legal, economic, cultural, and/or social).	393	carbon dating	161	research pros and cons of uses for radioactive elements
				393	radioisotopes in science and medicine		
				400	research pros and cons of nuclear technology		

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

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II.03.01 Historical Perspectives	"MALAMA I KA 'AINA": Sustainability	9 - 12	Assess the benefits and drawbacks of biotechnology on the enviroment and society.	388 nuclear vs chemical reactions 393 carbon dating 393 radioisotopes in science and medicine 400 research pros and cons of nuclear technology	138 nuclear reactions 160 how do you simulate nuclear decay? 161 research pros and cons of uses for radioactive elements

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page		
II.03.02 Historical Perspectives	"MALAMA I KA 'AINA": Sustainability	9 - 12	Analyze, evaluate and propose possible solutions in sustaining life on Earth, considering the limited resources and fragile environmental conditions.	333	problems with disposing of plastics	163	consider a vehicle's fuel economy
				355	recycling tires	163	research how trees offset accumulation of CO2
				356	recycling discarded tires	163	can trees compensate for manmade CO2 from vehicles and industry?
				364	petroleum	172	save water for houseplants
				379	research fuel cells	172	perform water quality tests
				379	research environmental impact of fuel cells	174	wise use of water supply
				392	storage of nuclear waste	175	maintaining water supply quality
				400	problems caused by airborne pollutants	178	investigate effect of acid rain on microorganisms
				421	wise use of water		
				421	a water molecule is v-shaped		
				421	water structure and its function as a solvent		
				425	water cycle and conservation		
				430	water usage and quality		
				444	acid rain explained		
				448	research the issue of acid rain		

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

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II.13.01 The Physical Environment	Nature of Matter	9 - 12	Describe and explain properties of elements and their relationships in the Periodic Table.	320	groups of elements	133	using the periodic table
				321	groups of elements and valence shells	136	building and studying the periodic table
				321	studying the periodic table	141	build model of Na and Cl atoms and explain why they bond to form a molecule
				329	periodic table columns and valence electrons	142	arrangement of electrons and groups of elements
				330	bonding and periodic table position		
				332	periodic table and electronegativities		
				332	metals nonmetals and metalloids		
				335	periodic table and oxidation numbers		

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
II.13.02 The Physical Environment	Nature of Matter	9 - 12	Analyze the interactions of molecules and their relationship to the physical properties of compounds in the context of biological, chemical, and / or physical systems.	284 states of matter and arrangement of molecules 324 which element is more likely to combine with other elements? 324 use the periodic table to predict chemical formulas 330 ionic bonds 331 covalent bonds 332 distinguishing between ionic and covalent bonds 335 chemical bonding and the periodic table 357 chemical reactions involve rearrangement of atoms 364 carbon chains 394 photosynthesis and carbon reactions 395 fossil fuels and carbon reactions 421 a water molecule is v-shaped 421 water structure and its function as a solvent 487 biomolecules and energy 487 simple sugars are transported to cells	118 molecules in a liquid 118 investigate melting 141 modeling a chemical bond 143 classify ionic compounds 157 predict the products of double displacement reactions 162 carbon reactions and the environment 162 structure of fossil fuels 162 importance of fossil fuels 167 what happened at the molecular level? 167 investigate the dissolving process

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
				488	fats proteins and carbohydrates
II.13.03 The Physical Environment	Nature of Matter	9 - 12	Analyze the effects of various factors on chemical reactions.	364	formation of petroleum is a very slow chemical reaction
II.13.04 The Physical Environment	Nature of Matter	9 - 12	Analyze and explain the atomic and molecular changes in chemical reactions.	357	chemical reactions involve rearrangement of atoms
II.14.01 The Physical Environment	Energy, Its Transformation and Matter	9 - 12	Explain how different energy levels are associated with different configuration of atoms and molecules.	330 331 332 388	140 find the number of electrons in outermost level 143 classify ionic compounds 143 ionic compounds
II.14.02 The Physical Environment	Energy, Its Transformation and Matter	9 - 12	Describe waves as means of transmitting energy.	195 474	waves transmit energy energy and radiation relationships

**Correlation to Hawaii Content and Performance Standards III  
Foundations of Physical Science Student Text and Investigation Manual**

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II.14.03 The Physical Environment	Energy, Its Transformation and Matter	9 - 12	Apply the Laws of Conservation of Energy to describe the dynamics of a system.	60	conservation of momentum	36	energy conservation and the roller coaster
				88	potential and kinetic energy explained	36	investigate energy conservation
				90	conservation of energy explained	37	investigating conservation of energy with rollercoaster
				90	conservation of energy	38	conservation of energy and energy transformations
				92	energy transformations and conservation	84	waves in motion
				93	different forms of energy described	150	investigate conservation of mass
				96	prove that energy is conserved	158	energy in chemical reactions
				363	conservation of mass	188	specific heat and conservation of energy
				363	conservation of mass	198	food energy
II.14.04 The Physical Environment	Energy, Its Transformation and Matter	9 - 12	Explain what happens in the transformation of energy.	85	some input work is converted to heat	38	identify potential/kinetic energy conversions
				91	following an energy transformation	38	explore energy transformations
				91	following an energy transformation	39	make an energy flow chart
				91	energy conversions		
				92	where does "spent" energy go?		
				96	explain the "lost" energy		

**Correlation to Hawaii Content and Performance Standards III  
 Foundations of Physical Science Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page		
II.15.01 The Physical Environment	Forces, Motion, Sound, and Light	9 - 12	Analyze the forces and motions of moving objects and simple machines.	29	position vs. time graph discussion	12	model the car's motion graphically
				37	speed vs. time graph discussion	14	exploring acceleration on a ramp
				45	Newton's first law summarized	15	changes in motion can be represented graphically
				45	Newton's second law summarized	16	2nd law
				45	Newton's third law summarized	16	thinking about force
				46	force has potential to change motion	19	find correct relationship between force mass and acceleration
				48	Newton's first law in detail	19	discover 2nd law of motion
				48	Newton's laws explained and applied	20	force and motion with car and ramp
				49	Newton's second law in detail	20	investigate effect of gravity on motion
				49	force is related to acceleration	21	effect of friction on the car
				50	Newton's second law applied	22	car and ramp and Newton's 3rd law
				52	the effect of gravity	23	using 3rd law to explain common phenomena
				56	friction explained	25	discover mechanical advantage of ropes and pulleys
				59	Newton's third law in detail	27	changing force and distance on a lever
				64	solving problems using $f=ma$	27	set up a lever that has mechanical advantage
				64	research effect of friction on human joints		

**Correlation to Hawaii Content and Performance Standards III**  
***Foundations of Physical Science* Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page	
				67	how simple machines manipulate forces	30 exploring force and distance with ropes and pulleys
				69	how to calculate mechanical advantage	
				70	mechanical advantage of block and tackle	
				71	pliers as an example of a lever	
				71	the human body and simple machines	
				71	parts of a lever	
				71	how a lever works	
				72	mechanical advantage of a lever	
				75	how gears work	
				78	set up a lever with MA greater than 1	
				78	design a toothbrush	
				79	calculate mechanical advantage	
				79	analyze pulleys with different numbers of supporting strings	
				79	analyze block and tackle	
				80	analyze wheelbarrow	
				80	analyzing the jaw as a lever	

**Correlation to Hawaii Content and Performance Standards III**  
**Foundations of Physical Science Student Text and Investigation Manual**

Standard #: Strand	Content Standard	Grade Level	Benchmark	Volume 1 Student Text page	Volume 2 Investigation Manual page
				80 analyze block and tackle machine on a sailboat  80 analyze the human jaw as a simple machine	
II.15.02 The Physical Environment	Forces, Motion, Sound, and Light	9 - 12	Describe and explain the effects of multiple forces acting on an object.	51 net force explained  51 balanced and unbalanced forces	16 unbalanced forces and acceleration of car  22 car and ramp and Newton's 3rd law
II.15.03 The Physical Environment	Forces, Motion, Sound, and Light	9 - 12	Analyze the nature of electromagnetic radiation.	237 light waves and the electromagnetic spectrum  474 electromagnetic radiation	
II.15.04 The Physical Environment	Forces, Motion, Sound, and Light	9 - 12	Explain that the observed wavelength of a wave depends upon the relative motion of the source and the observer.	13 speed is relative  18 what is the speed of an object that is standing still?  25 conceptual models of motion  47 weight vs. mass	20 weight vs. mass
II.17.01 Earth Systems and the Universe	Forces of the Universe	9 - 12	Create an analogy showing the relationship between gravitational force, masses of objects, and the distance between them.	52 gravity depends on mass  54 Newton's law of universal gravitation  55 calculating gravitational force between objects	

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***Foundations of Physical Science* Student Text and Investigation Manual**

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II.17.02 Earth Systems and the Universe	Forces of the Universe	9 - 12	Explain the relationships between magnetic and electric forces.	105	charge is a fundamental property of matter	42	investigate electric charge
				106	static charge discussed	62	describing forces that magnets exert on each other
				107	explanation of coulomb	64	testing materials to see if they are affected by magnets
				108	how an electroscope works	66	compare electromagnets and permanent magnets
				108	electroscopes	68	investigate how an electric motor works
				159	magnetism explained	73	exploring electric generators
				163	understanding magnetic fields	73	use magnetic induction to create an electric field
				168	how electric motors work		
				170	dissecting an electric motor		
				171	electromagnetic induction explained		

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***Foundations of Physical Science* Student Text and Investigation Manual**

<b>Standard #: Strand</b>	<b>Content Standard</b>	<b>Grade Level</b>	<b>Benchmark</b>	<b>Volume 1 Student Text page</b>		<b>Volume 2 Investigation Manual page</b>	
II.18.01 Earth Systems and the Universe	Earth in the Solar System	9 - 12	Evaluate the consequences of human activities on an Earth system (e.g., driving cars increase CO2 emission, causing ozone depletion), and vice- versa.	379	hydrogen-powered cars and the environment	52	the cost of using electrical appliances
				379	research fuel cells	163	too much CO2
				379	research environmental impact of fuel cells	163	research how trees offset accumulation of CO2
				391	nuclear vs. fossil fuels		
				391	impact of nuclear energy		
				395	fossil fuels		
				400	reducing pollution		
				400	problems caused by airborne pollutants		
				444	impact of using fossil fuels		