

Correlation to Hawaii Content and Performance Standards: Physical Science and Inquiry

Introduction to Earth and Space Science Student Text and Investigation Manual

Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
I.01.01 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Develop and clarify questions and hypotheses that guide scientific investigations.	3	what is temperature	21	investigating how specific heat of water regulates Earth's temperature
				8	asking questions pertaining to specific heat and heat flow	24	testing hypothesis of why seasons occur against your observations in the investigation
				24	why is Earth's atmosphere different from other planets	24	formulate a hypothesis about why the seasons occur
				25	why do ears pop	4	conducting investigation of efficiency of immersion heater
				44	why does Earth have seasons	44	simulating the effect of acid rain on daphnia
				53	how does rain form	44	formulate hypothesis
				61	how do animals survive in the desert	57	identifying how the earthquake model represents an earthquake
				67	what is a carbon sink	61	develop a research plan for studying volcanoes
				73	why haven't we run out of water	9	conducting experiments on heat transfer
				78	what is in your tap water		
				81	what is acid rain		
				85	why are oceans salty		
				92	describe steps you would take to determine how pH affects frog population		
				104	proving hypotheses for sea-floor spreading		
				108	why doesn't Earth get bigger and bigger		
				154	form a hypothesis		
				162	what causes eclipses		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
				195	is Pluto a planet		

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I.01.02 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Design and conduct scientific investigations to test hypotheses.	92	describe steps you would take to determine how pH affects frog population	10 14 21 25 4 40 44 57 61 76 9	design and construct an aneroid barometer making qualitative observations of the amount of ozone present in the school environment investigating how specific heat of water regulates Earth's temperature measuring the intensity of light using an electric meter and solar cell and light bulb conducting investigation of efficiency of immersion heater visit local water supply and perform testing simulating the effect of acid rain on daphnia identifying how the earthquake model represents an earthquake develop a research plan for studying volcanoes identifying the parts of a refracting telescope and making observations of the moon's surface conducting experiments on heat transfer

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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.	11	heat equation	13	calculating error between your barometer and a commercial barometer
				37	what percentage comes from this source? (problem 4)	13	constructing a graph from atmospheric pressure data
				117	determining distance to an epicenter	15	importance of good record keeping in order to avoid error
				121	average density (#5)	19	graphing water and ice temperature readings
				121	what explains the difference in density? (#5)	22	constructing a graph of time vs. temperature
				179	how big is Earth?	3	find equation for trend line
				192	average distance from the sun	3	construct a graphical model
				219	inverse square law	43	organize water quality data into a table
						47	constructing a graph of drops of acid vs pH
						5	construct a temperature vs. time graph
						55	evaluating your completed bathymetric map
						71	evaluate your ability to interpret rock formations
						81	inverse square law

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
I.01.04 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Formulate scientific explanations and conclusions and models using logic and evidence.	11	heat equation	13	constructing a graph from atmospheric pressure data
				28	atmospheric pressure at various altitudes graph	19	graphing water and ice temperature readings
				152	Moh's hardness scale	22	constructing a graph of time vs. temperature
				219	inverse square law	3	find equation for trend line
				219	apparent brightness vs. distance graph	3	construct a graphical model
				225	use the diagram to answer the questions (#2)	33	determining relationship between temperature of the atmosphere and relative humidity
				225	arrange the items in the table (#3)	34	interpreting Doppler radar images
				225	use the diagram to answer the questions (#4)	47	constructing a graph of drops of acid vs pH
						5	construct a temperature vs. time graph
						55	evaluating your completed bathymetric map
						61	finding a pattern of volcanoes on a bathymetric map
						71	evaluate your ability to interpret rock formations
						81	inverse square law

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
I.01.05 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Communicate and defend scientific explanations and conclusions.			41 43 45	create water quality report write paragraph to explain results write summary of findings
I.01.06 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Identify and analyze alternative explanations and conclusions and models.	98	Kelvin's calculations of Earth's age	24 44 47 48 59 9	testing hypothesis of why seasons occur against your observations in the investigation making hypotheses and testing them against observations analyzing the results of the buffered acid experiment reconstruct a series of events from clues interpreting how the drumming affects the intensity of the earthquake in the model explaining efficiency of heat transfer based on data
I.01.07 Science as Inquiry	Doing Scientific Inquiry	9 - 12	Revise scientific explanations and conclusions based on additional information/data gathered.			13	evaluating your aneroid barometer design

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
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.	38	observing an aurora	15	collecting Schönbein strips for detecting ozone
				79	making observations and asking questions	17	predicting areas with high ozone concentration based on your data
				204	what evidence was used to predict the existence of the Kuiper Belt?	18	collecting data of temperature and sensations
				204	use the data to answer the questions	20	predicting what would happen if you place your ice/water test tube into a hot cup or a cold cup
				226	analysis with a spectrometer (#4)	22	collecting temperature and time data
						26	collecting qualitative data of light intensity at scale distance from the sun
						33	collecting wet and dry bulb temperature readings
						41	create water quality report
						43	write paragraph to explain results
						43	organize water quality data into a table
						44	observing daphnia and recording movements and behavior
						45	write summary of findings
						45	writing up a lab report

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
						63	estimating the number of meteor collisions on Earth during the last 3.5 billion years
						66	predicting the results of the crystal-growing experiment
						67	recording observations of crystal growing
						75	recording the changes in the moon over a month
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.	20	research the history of heat and temperature	17	researching the causes of ozone
				92	research local water supply history	23	researching how bodies of water affect climate
				201	research space solar power	38	researching an animal that is adapted to live in the biome you studied
						41	create water quality report
						42	researching where your water comes from
						43	write paragraph to explain results
						45	write summary of findings
						51	researching forensic science

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
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.	98	Kelvin's calculations of Earth's age	13	constructing a graph from atmospheric pressure data
						16	evaluating your qualitative ozone strips
						19	graphing water and ice temperature readings
						22	constructing a graph of time vs. temperature
						3	construct a graphical model
						47	constructing a graph of drops of acid vs pH
						5	construct a temperature vs. time graph
						55	evaluating your completed bathymetric map
						71	evaluate your ability to interpret rock formations

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
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.	95	relative dating and modern geology based on Steno's theories		
				102	theory of plate tectonics		
				137	Darwin's theories of the Andes formation		
				140	what causes ice ages		
				185	theories of origin of the moon		
				221	Big Bang theory		
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.			13	evaluating your aneroid barometer design
						55	evaluating your completed bathymetric map
						71	evaluate your ability to interpret rock formations

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
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.	8	asking questions pertaining to specific heat and heat flow		
				24	why is Earth's atmosphere different from other planets		
				25	why do ears pop		
				44	why does Earth have seasons		
				53	how does rain form		
				61	how do animals survive in the desert		
				67	what is a carbon sink		
				73	why haven't we run out of water		
				78	what is in your tap water		
				81	what is acid rain		
				85	why are oceans salty		
				108	why doesn't Earth get bigger and bigger		
				162	what causes eclipses		
				195	is Pluto a planet		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
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.	20	research the history of heat and temperature	17	researching the causes of ozone
				92	research local water supply history	23	researching how bodies of water affect climate
				201	research space solar power	38	researching an animal that is adapted to live in the biome you studied
						41	create water quality report
						42	researching where your water comes from
						43	write paragraph to explain results
						45	write summary of findings
						51	researching forensic science
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.	25	why do ears pop	31	the food paradox of the oceans
				56	meteorologists use atmospheric pressure data to understand movement of weather systems		
				222	evidence for Big Bang theory		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
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.	61 64 73 79 82	how do animals survive in the desert? how do savanna animals survive the periodic fires? the water cycle pond ecosystem and water quality acid rain formation system		
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.	12 73 79 82	thermal equilibrium the water cycle pond ecosystem and water quality acid rain formation system		
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.	37 46 70 98 107 150 188 198	computer modeling to predict greenhouse effects modeling air currents create a model (#1) model of Earth's history modeling plate boundaries rock cycle model solar system modeling model of the sun's anatomy	18 28 56 82	modeling the effect of greenhouse gases on Earth's temperature modeling underwater rivers and waterfalls and springs construct a model that simulates an earthquake setting up a scale model of the solar system

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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.	11	heat equation	13	constructing a graph from atmospheric pressure data
				37	computer modeling to predict greenhouse effects	18	modeling the effect of greenhouse gases on Earth's temperature
				46	modeling air currents	19	graphing water and ice temperature readings
				70	create a model (#1)	22	constructing a graph of time vs. temperature
				98	model of Earth's history	28	modeling underwater rivers and waterfalls and springs
				107	modeling plate boundaries	3	find equation for trend line
				150	rock cycle model	3	construct a graphical model
				188	solar system modeling	47	constructing a graph of drops of acid vs pH
				198	model of the sun's anatomy	5	construct a temperature vs. time graph
				219	inverse square law	56	construct a model that simulates an earthquake
						81	inverse square law
						82	setting up a scale model of the solar system

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
I.04.01 Safety	Doing Safety	9 - 12	Apply school, classroom, laboratory, and field trip rules, as appropriate, to maintain a safe learning environment.	4	safety caution on heating jar	18	safety in greenhouse gas investigation
						2	thermometer safety
						26	safety using light bulbs
						32	safety in swinging thermometers
						4	heat safety
						41	safety tip for testing local surface water
						42	safety tip for water testing
						44	safety tips for observing Daphnia
						8	heat safety
						80	safety in lab
						vi	safety in the laboratory

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
I.04.02 Safety	Doing Safety	9 - 12	Identify potentially unsafe conditions prior to the activity and explain how accidents can be prevented.	4	safety caution on heating jar	18	safety in greenhouse gas investigation
						2	thermometer safety
						26	safety using light bulbs
						32	safety in swinging thermometers
						4	heat safety
						41	safety tip for testing local surface water
						42	safety tip for water testing
						44	safety tips for observing Daphnia
						8	heat safety
						80	safety in lab
						vi	safety in the laboratory

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
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.	4	safety caution on heating jar	18	safety in greenhouse gas investigation 2 thermometer safety 26 safety using light bulbs 32 safety in swinging thermometers 4 heat safety 41 safety tip for testing local surface water 42 safety tip for water testing 44 safety tips for observing Daphnia 8 heat safety 80 safety in lab vi safety in the laboratory
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		
I.04.05 Safety	Doing Safety	9 - 12	Assist teacher as requested in case of emergency.		featured throughout CPO Science program		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
I.04.06 Safety	Doing Safety	9 - 12	Document and apply appropriate safety protocols when conducting scientific activities in and out of the classroom.	4	safety caution on heating jar	18 2 26 32 4 41 42 44 8 80 vi	safety in greenhouse gas investigation thermometer safety safety using light bulbs safety in swinging thermometers heat safety safety tip for testing local surface water safety tip for water testing safety tips for observing Daphnia heat safety safety in lab safety in the laboratory
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.	92	study claims made by bottled water companies	43	study water filtration device claims

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
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.	38	observing an aurora	15	collecting Schönbein strips for detecting ozone
				79	making observations and asking questions	18	collecting data of temperature and sensations
				121	average density (#5)		
				192	average distance from the sun	2	collecting temperature data
				204	what evidence was used to predict the existence of the Kuiper Belt?	22	collecting temperature and time data
				204	use the data to answer the questions	26	collecting qualitative data of light intensity at scale distance from the sun
				226	analysis with a spectrometer (#4)	33	collecting wet and dry bulb temperature readings
						44	making detailed observations
						44	observing daphnia and recording movements and behavior
						46	collecting pH readings while adding carbon dioxide
						5	collecting time and temperature data
						67	recording observations of crystal growing
						73	using your sundial to collect accurate data
						75	recording the changes in the moon over a month

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
						77	calibrating your telescope
						9	collecting and recording time and temperature data
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.			13	constructing a graph from atmospheric pressure data
						19	graphing water and ice temperature readings
						22	constructing a graph of time vs. temperature
						3	construct a graphical model
						47	constructing a graph of drops of acid vs pH
						5	construct a temperature vs. time graph
						55	evaluating your completed bathymetric map
						71	evaluate your ability to interpret rock formations

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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.			17	predicting areas with high ozone concentration based on your data
						20	predicting what would happen if you place your ice/water test tube into a hot cup or a cold cup
						63	estimating the number of meteor collisions on Earth during the last 3.5 billion years
						66	predicting the results of the crystal-growing experiment

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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.	92	describe steps you would take to determine how pH affects frog population	10 14 21 25 4 40 44 57 61 76 9	design and construct an aneroid barometer making qualitative observations of the amount of ozone present in the school environment investigating how specific heat of water regulates Earth's temperature measuring the intensity of light using an electric meter and solar cell and light bulb conducting investigation of efficiency of immersion heater visit local water supply and perform testing simulating the effect of acid rain on daphnia identifying how the earthquake model represents an earthquake develop a research plan for studying volcanoes identifying the parts of a refracting telescope and making observations of the moon's surface conducting experiments on heat transfer

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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.			16	evaluating your qualitative ozone strips
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.	92	forming a hypothesis and testing through experimentation (#5)	18	investigating the effect of greenhouse gases
				103	critiquing Wegener's theories of continental drift	22	analyzing data
				176	identify question, hypothesis, procedure, and results (#1)	24	developing a hypothesis
				186	early theories of the solar system	43	analyzing results and drawing conclusions
						57	identifying how the earthquake model represents an earthquake
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.	20	research the history of heat and temperature		
				92	research local water supply history		

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II.01.03 Historical Perspectives	Understanding Scientific Inquiry and the Character of Scientific Knowledge	9 - 12	Explain how scientists prevent biases in research.	157	history of calendars	14	contributions of Schönbein
				159	counting the days in a year		
				160	the history of clocks and the division of time		
				163	ancient beliefs about solar eclipses		
				168	history of the telescope		

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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.	4	balloons expands or contracts due to thermal expansion		connecting the latent heat investigation to Earth 20
				6	temperature vs. thermal energy for a cup or pot of soup	17	suggesting ways that ozone concentrations could be reduced
				13	understanding thermal energy through cocoa example	34	understanding Doppler radar
				17	examples of reflectors and absorbers	40	water quality testing
				25	why do ears pop	41	researching and preparing for a field trip to test surface water
				28	atmospheric pressure in Denver		
				42	using the North Star to estimate your latitude		
				61	how do animals survive in the desert		
				110	analogy of plate movements		
				122	describe the work of a geologist and paleontologist and seismologist		

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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.	4	balloons expands or contracts due to thermal expansion		connecting the latent heat investigation to Earth 20
				6	temperature vs. thermal energy for a cup or pot of soup	13	evaluating the relationship between atmospheric pressure and weather
				13	understanding thermal energy through cocoa example	17	suggesting ways that ozone concentrations could be reduced
				15	convection and sea breezes	31	the food paradox of the oceans
				17	examples of reflectors and absorbers	34	understanding Doppler radar
				25	why do ears pop	41	researching and preparing for a field trip to test surface water
				25	why do ears pop		
				28	atmospheric pressure in Denver		
				41	patterns of heating and cooling on Earth		
				42	using the North Star to estimate your latitude		
				56	meteorologists use atmospheric pressure data to understand movement of weather systems		
				60	patterns in storm activity across the globe		
				61	how do animals survive in the desert		

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				107	patterns of earthquakes and volcanoes		
				110	analogy of plate movements		
				114	boundaries of tectonic plates		
				127	the Ring of Fire		
				158	lunar cycles		
				183	tides		
				211	categorizing stars with H-R diagrams		
				222	evidence for Big Bang theory		

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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.	23	nitrogen cycle	17	research the causes of ozone in the lower atmosphere
				31	effects of CFC's on the ozone layer	40	predict the quality of surface water to be tested and justify your answer
				31	London Agreement of 1991	40	actions to take to improve water quality
				34	effects of burning fossil fuels	86	solar energy can be used to generate electricity without producing pollution
				34	changes to the oceans due to increasing global temperatures		
				35	hydrogen powered cars		
				35	should governments enforce changes for lowering greenhouse gas levels		
				67	permafrost		
				73	governments managing water resources		
				77	the clean water act		
				80	effect of excess nitrates on environment		
				81	effects of acid rain on natural environments		
				82	impact of using fossil fuels		
				83	illustration of acid rain formation		
				83	catalytic converters and scrubbing reduce acid rain		

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				87	impact of increased CO2 in oceans		
				92	is acid rain a problem in your community?		
				92	what is the history of your community's water supply and treatment		
				92	how is the government addressing the problem of acid rain?		
				92	research economic impact of producing gases that cause acid rain		
				112	what we can learn from seismographs		
				118	understanding earthquakes allows engineers to design safer buildings		
				142	environmental impact of urban sprawl		
				142	how urban sprawl changes local climate		
				201	using photovoltaic cells		

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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.	56	temperature inversion	17	research the causes of ozone in the lower atmosphere
				76	water cycle and conservation	40	predict the quality of surface water to be tested and justify your answer
				77	The Clean Water Act		
				77	wise use of water		
				79	water quality testing	40	wise use of water supply
				79	water usage and quality	41	address what you can do to maintain or improve the water quality at the test site
				80	water quality testing		
				81	effects of acid rain on the soil	41	maintaining water supply quality
				81	acid rain		
				81	acid rain		
				82	causes and health effects of acid rain	42	save water for houseplants
				87	impact of increased CO2 on oceans	42	perform water quality tests
				87	impact of increased CO2 on oceans	44	the effects of acid rain on organisms in aquatic environments
				88	pollution and the ocean food chain	44	the effects of acid rain on organisms in aquatic environments
				89	pollution and the ocean food chain		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
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.	23	nitrogen cycle	17	research the causes of ozone in the lower atmosphere
				31	effects of CFC's on the ozone layer	40	predict the quality of surface water to be tested and justify your answer
				34	changes to the oceans due to increasing global temperatures	40	actions to take to improve water quality
				34	effects of burning fossil fuels	40	wise use of water supply
				67	permafrost	41	maintaining water supply quality
				76	water cycle and conservation	42	save water for houseplants
				77	wise use of water	42	perform water quality tests
				79	water usage and quality	44	investigate effect of acid rain on microorganisms
				81	acid rain explained		
				81	effects of acid rain on natural environments		
				83	illustration of acid rain formation		
				87	impact of increased CO2 in oceans		
				92	research the issue of acid rain		
				142	how urban sprawl changes local climate		
				142	environmental impact of urban sprawl		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
II.05.03 Organisms and Development	Interdependence	9 - 12	Analyze the interdependence within and between terrestrial, aquatic and atmospheric systems.	34	changes to the oceans due to increasing global temperatures	23	research how large bodies of water affect climate
				43	Earth's temperature varies with latitude	23	research how large bodies of water affect climate
				48	effects of the Gulf Stream on climate of Great Britain	28	investigate how the ocean's salinity affects its density
				48	descriptions of ocean currents and their effects on climate	31	understanding the Atlantic gyre
				49	water in the atmosphere affects weather patterns	44	the effects of acid rain on organisms in aquatic environments
				56	temperature inversion		
				62	effect of cold ocean currents on formation of fog deserts		
				63	effect of warm ocean currents on formation of tropical rainforest		
				65	effect of large bodies of water on climate		
				67	alpine tundra occurs at high altitudes		
				81	acid rain		
				82	causes and health effects of acid rain		
				83	illustration of acid rain formation		
				84	oceans in the water cycle		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
				85	sources of salts in the ocean		
				86	composition of seawater		
				87	impact of increased CO2 on oceans		
				133	volcanoes and water vapor		
				138	landforms shaped by water		
				142	how urban sprawl changes local climate		
II.16.01	Universe	9 - 12	Explain how stars produce energy from nuclear reactions and other processes that led to the formation of all the elements.	212	the life cycle of stars	79	observe and describe the appearance of the moon and Jupiter and its moons
Earth Systems and the Universe				213	description and illustration of the life cycle of stars	88	light emission and chemical composition
				214	elements formed by nuclear fusion in stars	91	spectral lines and elements
				214	birth of elements		
				214	death of massive stars		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
II.16.02 Earth Systems and the Universe	Universe	9 - 12	Compare and contrast how stars are similar, yet different from each other.	212	the life cycle of stars	79	observe and describe the appearance of the moon and Jupiter and its moons
				213	death of small to medium stars results in white dwarfs and planetary nebula and black dwarfs	88	using spectroscopy to analyze the light emitted by stars and identify most common elements
				213	description and illustration of the life cycle of stars		
				214	death of massive stars results in supernovas and neutron stars and black holes		
				214	elements formed by nuclear fusion in stars		
II.16.03 Earth Systems and the Universe	Universe	9 - 12	Illustrate how information about the Universe is collected and analyzed by using technology.	168	history of the telescope	88	understand why spectroscopy is an important tool of astronomers
				169	types and uses of telescopes		
				170	types and uses of telescopes	92	measuring apparent brightness to calculate the distance to stars and galaxies
				171	satellites as tools of astronomy		
				172	spacecraft as tools of astronomy		
				208	the use of spectroscopy to analyze stars		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
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.	180	Newton's law of universal gravitation	81	relating the relationship between orbital speed and distance to the equation of universal gravitation

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
II.18.01	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.	23	nitrogen cycle	17	research the causes of ozone in the lower atmosphere
Earth Systems and the Universe				31	effects of CFC's on the ozone layer	40	predict the quality of surface water to be tested and justify your answer
				34	changes to the oceans due to increasing global temperatures	40	predict the quality of surface water to be tested and justify your answer
				34	effects of burning fossil fuels	40	predict the quality of surface water to be tested and justify your answer
				56	temperature inversion	40	actions to take to improve water quality
				67	permafrost	41	address what you can do to maintain or improve the water quality at the test site
				77	The Clean Water Act	44	the effects of acid rain on organisms in aquatic environments
				79	water quality testing	44	the effects of acid rain on organisms in aquatic environments
				80	effect of excess nitrates on environment	86	solar energy can be used to generate electricity without producing pollution
				80	water quality testing		
				81	effects of acid rain on the soil		
				81	effects of acid rain on natural environments		
				81	acid rain		
				81	acid rain		
				82	causes and health effects of acid rain		
				82	impact of using fossil fuels		
				83	illustration of acid rain formation		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
				87	impact of increased CO2 on oceans		
				87	impact of increased CO2 in oceans		
				87	impact of increased CO2 on oceans		
				88	pollution and the ocean food chain		
				89	pollution and the ocean food chain		
				142	how urban sprawl changes local climate		
				142	environmental impact of urban sprawl		
				201	using photovoltaic cells		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
II.18.02 Earth Systems and the Universe	Earth in the Solar System	9 - 12	Analyze energy transfer and its effects on global climate, aquatic and terrestrial processes.	32	transfer of energy in and out of Earth's atmosphere	86	solar energy can be used to generate electricity without producing pollution
				32	distribution of incoming solar radiation		
				33	Earth's "energy budget"	86	determine the efficiency of a photovoltaic cell
				37	Earth's internal energy		
				82	impact of using fossil fuels		
				134	description of geothermal energy		
				197	energy from the sun		
				200	harnessing the sun's energy		
				201	using photovoltaic cells		
				201	the efficiency of photovoltaic cells		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
II.18.03 Earth Systems and the Universe	Earth in the Solar System	9 - 12	Justify why global atmospheric subsystems necessitate international cooperation in pollution control.	33	greenhouse effect and greenhouse gasses	18	investigate the temperature effects of greenhouse gases
				35	global temperature changing over time	29	exploring how temperature-dependent layering creates currents
				37	computer modeling to predict greenhouse effects	44	the effects of acid rain on organisms in aquatic environments
				45	convection currents in the atmosphere	47	effect of ocean on carbon dioxide levels in the atmosphere
				47	global wind patterns		
				54	effects of moving air masses		
				54	cold fronts		
				55	jet streams		
				55	warm fronts		
				56	temperature inversion		
				81	acid rain		
				82	causes and health effects of acid rain		
				87	impact of increased CO2 on oceans		
				102	Earth's surface is changing		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
II.19.01 Earth Systems and the Universe	Forces that Shape the Earth	9 - 12	Analyze how any of the Earth's Systems shapes the Earth.	35	global temperature changing over time	53	identifying tectonic plates and plate boundaries
				102	definition of plate tectonics	54	predicting plate movement over 50 million years and the resultant land features
				102	predicting what Earth might look like in 50 million years	64	estimating the effects of meteor impacts on Earth
				102	Earth's surface is changing	65	identifying which geologic features on Earth were caused by meteors
				106	theory of plate tectonics		
				107	describing plate boundaries		
				107	activity of Earth's crust at plate boundaries		
				108	divergent plate boundaries		
				108	balance of creating and consuming Earth's crust		
				108	land features resulting from divergent plate boundaries		
				109	convergent plate boundaries		
				109	resulting land features from subduction		
				110	transform plate boundaries		
				110	land features resulting from transform plate boundaries		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
				121	predict separation of North America and Europe in 75 million years		
				122	predict effects of divergent plate boundaries on Great Rift Valley		
				129	formation of Hawaiian Islands due to volcanic activity		
				132	volcanoes shape the Earth		
				136	constructive and destructive processes		
				136	constructive and destructive processes		
				137	constructive process of mountain building		
				137	mountain-building		
				138	the destructive process of erosion		
				138	changes in land features due to erosion		
				138	landforms shaped by water		
				139	wind erosion		
				139	formation of soil		
				140	effect of glaciers on land		
				150	the rock cycle		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
				150	the rock cycle		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
II.19.02 Earth Systems and the Universe	Forces that Shape the Earth	9 - 12	Relate the Theory of Plate Tectonics to our island formation, volcanic activity, and/ or earthquakes.	102	definition of plate tectonics	52	listing which kind of plate boundary is associated with each geologic feature
				104	sea-floor spreading and mid-ocean ridges	53	identifying tectonic plates and plate boundaries
				105	magnetic patterns on the sea floor	60	understanding the Volcanic Explosivity Index
				106	theory of plate tectonics	61	examining the magma chemistry of volcanoes and how it relates to a volcano's location
				107	describing plate boundaries	61	finding a pattern of volcanoes related to the locations of plate boundaries
				108	divergent plate boundaries		
				109	convergent plate boundaries		
				110	transform plate boundaries		
				111	causes and descriptions of earthquakes		
				111	earthquakes and plate tectonics		
				113	earthquakes rating scales		
				126	geologic basis for volcanic eruptions		
				126	formation of magma in Earth's mantle		
				127	where volcanic activity occurs		
				128	properties of volcanically formed rock		

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Standard #:	Content Standard	Grade Level	Benchmark	student text	detail	investigation	detail
				128	types and shapes of volcanoes		
				129	shield volcanoes		
				129	formation of shield volcanoes due to hot spots		
				129	geologic basis for shield volcanoes		
				130	stratovolcanoes		
				130	formation of stratovolcanoes due to subduction		
				130	geologic basis for stratovolcanoes		
				131	geologic bases for cinder cone volcanoes		
				133	types of volcanic rock		
				135	describing volcanic rock		