

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
EES01.01 9-12	Earth and Environmental Science Content	The learner will build an understanding of lithospheric materials, processes, changes, and uses with concerns for good stewardship.	Analyze the dependence of the physical properties of minerals on the arrangement and bonding of their atoms	554 559 561 570 571 572	properties of volcanically formed rock types of volcanic rock describing volcanic rock properties of minerals common minerals Mohs hardness scale	237	examining the magma chemistry of volcanoes and how it relates to a volcano's location
EES01.02 9-12	Earth and Environmental Science Content	The learner will build an understanding of lithospheric materials, processes, changes, and uses with concerns for good stewardship.	Classify the three major groups of rocks according to their origin, based on texture, mineral composition, and the processes responsible for their formation	554 559 561 573 575	properties of volcanically formed rock types of volcanic rock describing volcanic rock formation of igneous and sedimentary and metamorphic rocks identifying igneous and sedimentary and metamorphic rocks	237 242 244 246 247	examining the magma chemistry of volcanoes and how it relates to a volcano's location understanding how igneous rocks are formed and growing crystals to investigate their formation understanding how sedimentary rocks are formed and creating sedimentary deposits to investigate them understanding and investigating how metamorphic rocks are formed interpreting how different rock formations were formed

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES01.03 9-12	Earth and Environmental Science Content	The learner will build an understanding of lithospheric materials, processes, changes, and uses with concertns for good stewardship.	Assess the importance of the economic development of earth's finite rock, mineral, fossil fuel and other natural resources to society and our daily lives: availability, geographic distribution, wise use, conservation, recycling, and challenge of rehabilit	333	problems with disposing of plastics	52	the cost of using electrical appliances
				355	recycling tires	163	consider a vehicle's fuel economy
				356	recycling discarded tires	163	research how trees offset accumulation of CO ₂
				364	petroleum		
				379	research fuel cells	164	perform water quality tests
				379	research environmental impact of fuel cells	178	wise use of water supply
				391	impact of nuclear energy	178	actions to take to improve water quality
				391	nuclear vs. fossil fuels		
				392	storage of nuclear waste	178	predict the quality of surface water to be tested and justify your answer
				400	reducing pollution		
				400	problems caused by airborne pollutants	179	maintaining water supply quality
				414	effect of electrical generating facilities on dissolved oxygen in water	180	save water for houseplants
				414	environmental impact of electrical generating facilities	180	perform water quality tests
				432	water cycle and conservation	201	research the causes of ozone in the lower atmosphere
				433	wise use of water		
				435	water usage and quality	262	solar energy can be used to generate electricity without producing pollution
				437	effects of acid rain on natural environments		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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				438	impact of using fossil fuels		
				439	illustration of acid rain formation		
				443	impact of increased CO ₂ in oceans		
				471	nitrogen cycle		
				479	effects of CFC's on the ozone layer		
				482	effects of burning fossil fuels		
				482	changes to the oceans due to increasing global temperatures		
				515	permafrost		
				542	using seismic waves for oil and gas exploration		
				560	mineral deposits and diamonds		
				568	how urban sprawl changes local climate		
				627	using photovoltaic cells		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES01.04 9-12	Earth and Environmental Science Content	The learner will build an understanding of lithospheric materials, processes, changes, and uses with concertns for good stewardship.	Analyze the importance of soils: soil use and conservation, products from soil, and relate land use capabilities and major soil types in North Carolina	437	effects of acid rain on the soil		
				533	activity of Earth's crust at plate boundaries		
				534	balance of creating and consuming Earth's crust		
				562	constructive and destructive processes		
				562	constructive and destructive processes		
				565	formation of soil		
				576	the rock cycle		
				576	the rock cycle		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES01.05 9-12	Earth and Environmental Science Content	The learner will build an understanding of lithospheric materials, processes, changes, and uses with concertns for good stewardship.	Evaluate geologic hazards and their relationship to geologic processes and materials: volcanoes, earthquakes, mass wasting, and flooding.	537	causes and descriptions of earthquakes	236	understanding the Volcanic Explosivity Index
				537	earthquakes and plate tectonics	237	finding a pattern of volcanoes related to the locations of plate boundaries
				539	earthquakes rating scales		
				552	formation of magma in Earth's mantle	240	estimating the effects of meteor impacts on Earth
				552	geologic basis for volcanic eruptions	241	identifying which geologic features on Earth were caused by meteors
				553	where volcanic activity occurs		
				554	types and shapes of volcanoes		
				555	formation of Hawaiian Islands due to volcanic activity		
				555	formation of shield volcanoes due to hot spots		
				555	geologic basis for shield volcanoes		
				555	shield volcanoes		
				556	formation of stratovolcanoes due to subduction		
				556	stratovolcanoes		
				556	geologic basis for stratovolcanoes		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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				557	geologic bases for cinder cone volcanoes		
				558	volcanoes shape the Earth		
				563	constructive process of mountain building		
				564	the destructive process of erosion		
				565	wind erosion		
EES01.06 9-12	Earth and Environmental Science Content	The learner will build an understanding of lithospheric materials, processes, changes, and uses with concertns for good stewardship.	Interpret topographic, soil, geologic, and other maps and images for: the location and identification of soils and rock types, the id of erosional and depositional landforms, and the evaluation of landforms from tectonic activity.	510	using maps to identify mountain ranges	228	reading a bathymetric map
				540	where earthquakes occur	229	using a globe to identify mountain ranges
				541	earthquake hazard map	229	using a geologic hazard map of frequent earthquakes
				553	using a map to identify volcanoes		
				567	geologic hazard maps	237	plot locations of volcanoes using latitude and longitude
				580	using a geologic hazard map		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES02.01 9-12	Earth and Environmental Science Content	The learner will develop an understanding of tectonic processes and their human impacts.	Analyze the evidence for the development of the Theory of Plate Tectonics: propelling forces, plate boundary interactions, and features of the sea floor.	528	definition of plate tectonics	228	reading a bathymetric map
				530	sea-floor spreading and mid-ocean ridges	228	listing which kind of plate boundary is associated with each geologic feature
				531	magnetic patterns on the sea floor	229	using a geologic hazard map of frequent earthquakes
				532	theory of plate tectonics		
				533	describing plate boundaries	229	identifying tectonic plates and plate boundaries
				534	divergent plate boundaries	236	understanding the Volcanic Explosivity Index
				535	convergent plate boundaries	237	finding a pattern of volcanoes related to the locations of plate boundaries
				536	transform plate boundaries		
				537	causes and descriptions of earthquakes		
				539	earthquakes rating scales		
				540	where earthquakes occur		
				541	earthquake hazard map		
				554	types and shapes of volcanoes		
				555	shield volcanoes		
				555	formation of shield volcanoes due to hot spots		
				556	formation of stratovolcanoes due to subduction		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				556	stratovolcanoes		
				567	geologic hazard maps		
				580	using a geologic hazard map		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES02.02 9-12	Earth and Environmental Science Content	The learner will develop an understanding of tectonic processes and their human impacts.	Evaluate the forces that propel tectonic plates.	533	describing plate boundaries	229	identifying tectonic plates and plate boundaries
				534	divergent plate boundaries	240	estimating the effects of meteor impacts on Earth
				535	convergent plate boundaries	241	identifying which geologic features on Earth were caused by meteors
				536	transform plate boundaries		
				537	causes and descriptions of earthquakes		
				539	earthquakes rating scales		
				551	structure of a volcano		
				554	figure showing structure of different types of volcanoes		
				555	formation of Hawaiian Islands due to volcanic activity		
				558	volcanoes shape the Earth		
				563	constructive process of mountain building		
				564	the destructive process of erosion		
				565	wind erosion		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES02.03 9-12	Earth and Environmental Science Content	The learner will develop an understanding of tectonic processes and their human impacts.	Analyze the model of the earth's interior resulting from the study of earthquake waves.	525 526 537 537 538 539 552	formation of Earth's layers description of Earth's layers conversion of energy in rocks causes seismic waves causes and descriptions of earthquakes seismic waves earthquakes rating scales formation of magma in Earth's mantle		
EES02.04 9-12	Earth and Environmental Science Content	The learner will develop an understanding of tectonic processes and their human impacts.	Analyze the nature, location of epicenters, and magnitude of earthquakes: folds, faults, level of seismic activity in North Carolina.	537 539	causes and descriptions of earthquakes earthquakes rating scales		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES03.01 9-12	Earth and Environmental Science Content	The learner will build an understanding of the origin and evolution of the earth system.	Interpret the order and impact of events in the geologic past: origin of the earth system, origin of life, relative and absolute dating techniques, statistical models of radioactive decay, diversity of life, fossils evidence the past, evolution/extinction	522 523 523 524 569 619	relative dating interpreting rock formations faunal succession extinction of the dinosaurs due to giant meteor hitting Earth studying moon rocks on Earth how an asteroid event may have caused the extinction of dinosaurs	225 226	determining the relative ages of rock formations sequencing events in a geologic cross-section
EES03.02 9-12	Earth and Environmental Science Content	The learner will build an understanding of the origin and evolution of the earth system.	Assess evidence for and the influence on the divisions of geologic time of the major geologic events and paleoclimatic changes in global geologic history: uniformitarianism, unconformities, stratigraphic principles, floral and faunal succession.	524 566	table and description of the geologic time scale ice ages		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES03.03 9-12	Earth and Environmental Science Content	The learner will build an understanding of the origin and evolution of the earth system.	Evaluate the geologic history of North Carolina and the Appalacian origin.		featured in ancillary component		featured in ancillary component
EES04.01 9-12	Earth and Environmental Science Content	The learner will build an understanding of the hydrosphere and its interactions and influences on the lithosphere, the atmosphere, and environmental quality.	Evaluate the stream erosion and depositional processes: land forms resulting, formation of stream channels, nature and characteristics of sediments, ability of running water to sort sediments.	564	landforms shaped by water		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES04.02 9-12	Earth and Environmental Science Content	The learner will build an understanding of the hydrosphere and its interactions and influences on the lithosphere, the atmosphere, and environmental quality.	Evaluate water beneath the earth's surface: storage and movement, environmental impact of a growing human population, impact of building and development, causes of natural and manmade contamination.	411	effects of PCB's in Great Lakes	178	actions to take to improve water quality
				414	effect of electrical generating facilities on dissolved oxygen in water	178	predict the quality of surface water to be tested and justify your answer
				433	The Clean Water Act		
				435	water quality testing	178	predict the quality of surface water to be tested and justify your answer
				436	water quality testing		
				437	acid rain		
				437	effects of acid rain on natural environments	179	address what you can do to maintain or improve the water quality at the test site
				437	acid rain		
				438	causes and health effects of acid rain	182	the effects of acid rain on organisms in aquatic environments
				439	illustration of acid rain formation		
				443	impact of increased CO2 in oceans	182	the effects of acid rain on organisms in aquatic environments
				443	impact of increased CO2 on oceans		
				443	impact of increased CO2 on oceans		
				444	pollution and the ocean food chain		
				445	pollution and the ocean food chain		
				471	nitrogen cycle		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				479	effects of CFC's on the ozone layer		
				482	effects of burning fossil fuels		
				482	changes to the oceans due to increasing global temperatures		
				504	temperature inversion		
				515	permafrost		
				568	how urban sprawl changes local climate		
EES04.03 9-12	Earth and Environmental Science Content	The learner will build an understanding of the hydrosphere and its interactions and influences on the lithosphere, the atmosphere, and environmental quality.	Analyze the mechanisms for generating ocean currents: temperature, deep ocean circulation, salinity, planetary wind belts.	493	convection currents in the atmosphere	207	research how large bodies of water affect climate
				494	the Coriolis effect	213	exploring how temperature-dependent layering creates currents
				496	descriptions of ocean currents and their effects on climate	215	understanding the Atlantic gyre
				504	rotation of air masses due to Coriolis effect		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
EES04.04 9-12	Earth and Environmental Science Content	The learner will build an understanding of the hydrosphere and its interactions and influences on the lithosphere, the atmosphere, and environmental quality.	Analyze the mechanisms that produce the various types of shorelines and their resultant landforms: nature of underlying geology, long and short term sea-level history, and adjacent topography.	440	supply of water to oceans		
EES04.05 9-12	Earth and Environmental Science Content	The learner will build an understanding of the hydrosphere and its interactions and influences on the lithosphere, the atmosphere, and environmental quality.	Assess the formation and breaking of waves and their effect on shorelines, particularly the North Carolina coast.		featured in ancillary component		featured in ancillary component
EES04.06 9-12	Earth and Environmental Science Content	The learner will build an understanding of the hydrosphere and its interactions and influences on the lithosphere, the atmosphere, and environmental quality.	Evaluate environmental issues and solutions for North Carolina's wetlands, inland, and tidal environments: floodplains, fresh and brackish water marsh, estuaries, barriers, and inlets.		featured in ancillary component		featured in ancillary component

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES04.07 9-12	Earth and Environmental Science Content	The learner will build an understanding of the hydrosphere and its interactions and influences on the lithosphere, the atmosphere, and environmental quality.	Evaluate the phenomena of upwelling in the oceans and its influence on weather.	496	descriptions of ocean currents and their effects on climate	207	research how large bodies of water affect climate 215 understanding the Atlantic gyre
EES04.08 9-12	Earth and Environmental Science Content	The learner will build an understanding of the hydrosphere and its interactions and influences on the lithosphere, the atmosphere, and environmental quality.	Evaluate the ecological services provided by a healthy ocean: a carbon sink, the largest watershed, climate control.	437	acid rain	178	actions to take to improve water quality
				437	effects of acid rain on natural environments	182	the effects of acid rain on organisms in aquatic environments
				438	causes and health effects of acid rain	207	research how large bodies of water affect climate
				439	illustration of acid rain formation	215	understanding the Atlantic gyre
				443	impact of increased CO2 on oceans		
				471	nitrogen cycle		
				482	changes to the oceans due to increasing global temperatures		
				496	descriptions of ocean currents and their effects on climate		
				504	temperature inversion		
				568	how urban sprawl changes local climate		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES05.01 9-12	Earth and Environmental Science Content	The learner will build an understanding of the dynamics and composition of the atmosphere and its local and global processes influencing climate and air quality.	Analyze the formation of the atmosphere and hydrosphere as a result of the phenomena of out- gasing as the primordial earth cooled.	440 471 472 477 478 524 566	oceans as part of the hydrosphere description of Earth's atmosphere effect of life on Earth's atmosphere layers of the atmosphere layers of the atmosphere table and description of the geologic time scale ice ages		
EES05.02 9-12	Earth and Environmental Science Content	The learner will build an understanding of the dynamics and composition of the atmosphere and its local and global processes influencing climate and air quality.	Analyze the structure of the atmosphere: temperature, pressure, water vapor, and atmospheric transparency.	471 473 475 476 497	composition of Earth's atmosphere definition of atmospheric pressure how atmospheric pressure changes with altitude graph showing atmospheric pressure vs. altitude water in the atmosphere affects weather patterns	198	detecting ozone which is a protective atmosphere gas against high energy radiation

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES05.03 9-12	Earth and Environmental Science Content	The learner will build an understanding of the dynamics and composition of the atmosphere and its local and global processes influencing climate and air quality.	Analyze weather systems: movement, humidity, cloud formation, and precipitation.	497	factors which influence the weather	217	finding relative humidity
				498	phase changes in the atmosphere and dewpoint	219	use radar to detect a tornado
				499	cloud formation	220	using radar to track a hurricane
				501	forms of precipitation		
				505	description of thunderstorms		
				506	description of hurricanes		
				507	description of tornadoes		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES05.04 9-12	Earth and Environmental Science Content	The learner will build an understanding of the dynamics and composition of the atmosphere and its local and global processes influencing climate and air quality.	Analyze atmospheric pressure: planetary wind systems, pressure cells, altitude, and local breezes.	473	definition of atmospheric pressure	207	research how large bodies of water affect climate
				475	how atmospheric pressure changes with altitude	223	research a particular biome
				476	graph showing atmospheric pressure vs. altitude		
				491	Earth's temperature varies with latitude		
				494	the Coriolis effect		
				495	global wind patterns		
				496	effects of the Gulf Stream on climate of Great Britain		
				502	effects of moving air masses		
				502	cold fronts		
				503	warm fronts		
				503	jet streams		
				504	rotation of air masses due to Coriolis effect		
				508	causes and effects of the El Nino Southern Oscillation		
				510	effect of cold ocean currents on formation of fog desserts		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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				510	different types of deserts and how they are formed		
				511	how tropical rainforests are formed		
				511	effect of warm ocean currents on formation of tropical rainforest		
				513	effect of large bodies of water on climate		
				515	alpine tundra occurs at high altitudes		
EES05.05 9-12	Earth and Environmental Science Content	The learner will build an understanding of the dynamics and composition of the atmosphere and its local and global processes influencing climate and air quality.	Analyze air masses and the life cycle of weather systems: air masses, frontal systems, hazardous weather, and warning systems and their effectiveness.	495	global wind patterns	219	use radar to detect a tornado
				497	factors which influence the weather	219	describe what safety precautions the National Weather Service recommends for tornado conditions
				499	cloud formation		
				502	cold fronts		
				502	effects of moving air masses	220	using radar to track a hurricane
				503	jet streams		
				503	warm fronts		
				505	description of thunderstorms		
				506	description of hurricanes		
				507	description of tornadoes		
				518	write an action plan to stay safe during a tornado		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES05.06 9-12	Earth and Environmental Science Content	The learner will build an understanding of the dynamics and composition of the atmosphere and its local and global processes influencing climate and air quality.	Evaluate meteorological observing, analysis, and prediction: worldwide observing systems, meteorological data depiction.	451 452 474 497	thermometers thermometers measuring atmospheric pressure with barometers sling psychrometer	186 194 218	accurately measuring temperature using thermometers construct and use an aneroid barometer using Doppler radar images to detect and track storms

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES05.07 9-12	Earth and Environmental Science Content	The learner will build an understanding of the dynamics and composition of the atmosphere and its local and global processes influencing climate and air quality.	Analyze the effects of human activity on the environment and the influence of issues on weather and climate.	379	research fuel cells	52	the cost of using electrical appliances
				379	research environmental impact of fuel cells	163	too much CO ₂
				379	hydrogen-powered cars and the environment	163	research how trees offset accumulation of CO ₂
				391	impact of nuclear energy	178	actions to take to improve water quality
				395	fossil fuels	178	predict the quality of surface water to be tested and justify your answer
				400	reducing pollution	182	investigate effect of acid rain on microorganisms
				400	problems caused by airborne pollutants	182	the effects of acid rain on organisms in aquatic environments
				414	effect of electrical generating facilities on dissolved oxygen in water	201	research the causes of ozone in the lower atmosphere
				414	effect of electrical generating facilities on dissolved oxygen in water		
				436	effect of excess nitrates on environment		
				437	acid rain explained		
				437	effects of acid rain on natural environments		
				437	acid rain		
				438	causes and health effects of acid rain		
				439	illustration of acid rain formation		
				443	impact of increased CO ₂ in oceans		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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				443	impact of increased CO2 on oceans		
				448	research the issue of acid rain		
				471	nitrogen cycle		
				479	effects of CFC's on the ozone layer		
				482	effects of burning fossil fuels		
				482	changes to the oceans due to increasing global temperatures		
				504	temperature inversion		
				515	permafrost		
				568	how urban sprawl changes local climate		
EES06.01 9-12	Earth and Environmental Science Content	The learner will acquire an understanding of the earth in the solar system and its position in the universe.	Analyze the formation of the solar system.	641	how the solar system was formed		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
EES06.02 9-12	Earth and Environmental Science Content	The learner will acquire an understanding of the earth in the solar system and its position in the universe.	Analyze planetary motion and the physical laws that explain that motion: rotation, revolution, apparent diurnal motions of the sun and stars, tilt of the earth's axis, and parallelism of the earth's axis.	491 492 585 587 588 589 601 612 619 620	the effects of Earth's rotation on daytime heating and nighttime cooling Earth's tilt causes seasons Earth's rotation and patterns of day and night axial tilt causes the seasons solar eclipses solar eclipses identify seasons orbits of planets around the sun asteroids and comets meteors and meteorites and the Kuiper Belt	208 210 211 248 256	developing a hypothesis about why the seasons occur investigating how the distance of Earth from the sun affects its intensity investigating how Earth's tilt affects the sun's intensity building a sundial to keep track of daily time based on the cycles between Earth and the sun simulate an object in orbit and investigate how orbital period varies within distance
EES06.03 9-12	Earth and Environmental Science Content	The learner will acquire an understanding of the earth in the solar system and its position in the universe.	Evaluate astronomers' use of various instruments to extend their senses: optical telescopes, radio telescopes, spectroscope, and cameras.	594 595 596 597 598 634	history of the telescope types and uses of telescopes types and uses of telescopes satellites as tools of astronomy spacecraft as tools of astronomy the use of spectroscopy to analyze stars	264 268	understand why spectroscopy is an important tool of astronomers measuring apparent brightness to calculate the distance to stars and galaxies

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

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EES06.04 9-12	Earth and Environmental Science Content	The learner will acquire an understanding of the earth in the solar system and its position in the universe.	Assess the current scientific theories of the origin of the universe.	611 612 621 647 648 649	historical theories of the origin of the moon historical theories about the solar system historical theories of which objects were planets the Big Bang theory of the origin of the universe evidence for the Big Bang theory evidence for the Big Bang theory		
EES06.05 9-12	Earth and Environmental Science Content	The learner will acquire an understanding of the earth in the solar system and its position in the universe.	Examine the sources of stellar energies.	638 639 639 640 640 640 640	the life cycle of stars death of small to medium stars results in white dwarfs and planetary nebula and black dwarfs description and illustration of the life cycle of stars death of massive stars results in supernovas and neutron stars and black holes elements formed by nuclear fusion in stars birth of elements death of massive stars	255 264	observe and describe the appearance of the moon and Jupiter and its moons using spectroscopy to analyze the light emitted by stars and identify most common elements

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
EES06.06 9-12	Earth and Environmental Science Content	The learner will acquire an understanding of the earth in the solar system and its position in the universe.	Assess the spectra generated by stars and our sun as indicators of motion: Doppler effect, and red and blue shifts.	648 649	evidence for the Big Bang theory evidence for the Big Bang theory		
EES06.07 9-12	Earth and Environmental Science Content	The learner will acquire an understanding of the earth in the solar system and its position in the universe.	Evaluate Hubble's law and the concept of an ever-expanding universe.	648 649	evidence for the Big Bang theory evidence for the Big Bang theory		
EES06.08 9-12	Earth and Environmental Science Content	The learner will acquire an understanding of the earth in the solar system and its position in the universe.	Evaluate the life cycle of stars in the Hertzsprung-Russell Diagram (H-R Diagram).	638 639 639 640 640	the life cycle of stars description and illustration of the life cycle of stars death of small to medium stars results in white dwarfs and planetary nebula and black dwarfs elements formed by nuclear fusion in stars death of massive stars results in supernovas and neutron stars and black holes	255 264	observe and describe the appearance of the moon and Jupiter and its moons using spectroscopy to analyze the light emitted by stars and identify most common elements

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
EES07.01 9-12	Earth and Environmental Science Content	The learner will build an understanding of alternative choices facing human societies in their stewardship of the earth.	Analyze the relationship between the potential of technology to improve the quality of life and the possible causes of stress on the environment.	73	relationship between science and technology		
				395	impact of industrial revolution		
				414	effect of electrical generating facilities on dissolved oxygen in water		
				433	the clean water act		
				439	catalytic converters and scrubbing reduce acid rain		
				443	impact of carbon dioxide on life in the oceans		
				479	scientists detect loss of ozone in atmosphere		
				482	effects of global warming discovered		
				483	hydrogen powered cars		
				496	tracking ocean currents		
				511	trees and global climate		
				530	using echo sounders to map the sea floor		
				538	what we can learn from seismographs		
				544	understanding earthquakes allows engineers to design safer buildings		
				568	urban sprawl		
				597	using satellite technology		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				599	space shuttle		
EES07.02 9-12	Earth and Environmental Science Content	The learner will build an understanding of alternative choices facing human societies in their stewardship of the earth.	Analyze the interdependence of Earth's natural resources and systems, including land, air, and water, with the need to support human activity and reduce environmental impacts.	414	effect of electrical generating facilities on dissolved oxygen in water	178	actions to take to improve water quality
				437	effects of acid rain on natural environments	178	predict the quality of surface water to be tested and justify your answer
				439	illustration of acid rain formation		
				443	impact of increased CO2 in oceans		
				471	nitrogen cycle		
				479	effects of CFC's on the ozone layer		
				482	effects of burning fossil fuels		
				482	changes to the oceans due to increasing global temperatures		
				515	permafrost		
				568	how urban sprawl changes local climate		
				568	environmental impact of urban sprawl		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
EES07.03 9-12	Earth and Environmental Science Content	The learner will build an understanding of alternative choices facing human societies in their stewardship of the earth.	Assess how society weights the choices of economic progress, population growth and environmental stewardship and selects a balanced responsible course of action.	333	problems with disposing of plastics	163	consider a vehicle's fuel economy
				355	recycling tires	164	perform water quality tests
				356	recycling discarded tires	178	wise use of water supply
				364	petroleum	179	maintaining water supply quality
				392	storage of nuclear waste	180	save water for houseplants
				432	water cycle and conservation	180	perform water quality tests
				433	wise use of water		
				433	the clean water act		
				435	water usage and quality		
				439	catalytic converters and scrubbing reduce acid rain		
				483	hydrogen powered cars		
				538	what we can learn from seismographs		
				544	understanding earthquakes allows engineers to design safer buildings		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
GEN01.1	Unifying Threads of Understanding	Nature of Science	Develop an understanding of science as a human endeavor, nature of science knowledge and historical perspectives.	34	Newton's research impacted mathematics	130	investigate Rutherford's gold foil experiment
				34	Newton and the history of physics	198	contributions of Schönbein
				45	Newton's discovery of the 2nd law	215	the food paradox of the oceans
				45	Newton's Principia		
				46	oldest known standard weight		
				55	Newton and the apple legend		
				73	impact of Da Vinci's work		
				73	impact of technology		
				73	Leonardo DaVinci		
				86	James Watt		
				110	research Franklin's electricity experiments		
				115	Volta's batteries		
				131	Georg Ohm's work with circuits		
				134	history of superconductivity		
				160	Faraday's contributions		
				161	history of magnetism		
				312	history of atomic theory		
				312	Dalton's contributions		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				313	development of atomic theory		
				320	the quests of alchemists		
				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	Antoine Lavoisier		
				363	history of law of conservation of mass		
				370	research Lavoisier's contributions		
				391	scientific discovery and the atomic age		
				393	accomplishments of Marie Curie		
				393	history of nuclear chemistry		
				393	Marie and Pierre Curie		
				400	research the Clean Air Act of 1970 and 1990		
				448	research local water supply history		
				455	contributions of Joule		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				457	Joseph Black		
				468	research the history of heat and temperature		
				473	why do ears pop		
				504	meteorologists use atmospheric pressure data to understand movement of weather systems		
				542	studying seismic waves leads to information used in oil and gas exploration		
				545	predicting tsunamis		
				583	history of calendars		
				585	counting the days in a year		
				586	the history of clocks and the division of time		
				589	ancient beliefs about solar eclipses		
				594	history of the telescope		
				648	evidence for Big Bang theory		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
GEN02.1	Unifying Threads of Understanding	Science as Inquiry	Develop the ability to do scientific inquiry and perform safe and appropriate manipulation of materials, equipment, and technologies.	452	featured throughout CPO Science program safety caution on heating jar	20 24 26 40 44 56 58 146 150 158 168 172 179 180 182 186 188 192 202	safety tip for car/ramp setup ropes and pulley safety safety tip for hanging weights from lever electrical safety short circuit safety warning short circuit safety warning short circuit safety warning safety in the lab chemistry safety wear goggles and apron safety equipment hot water safety safety tip for testing local surface water safety tip for water testing safety tips for observing Daphnia thermometer safety heat safety heat safety safety in greenhouse gas investigation

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
						210 safety using light bulbs 216 safety in swinging thermometers 256 safety in lab	

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
GEN02.2	Unifying Threads of Understanding	Science as Inquiry	Develop a mastery of integrated process skills: acquiring, processing, and interpreting data; identifying variables and their relationships; designing investigations; experimenting; analyzing investigations; constructing hypotheses; formulating models.	5	measuring distance	4	difference between precise and accurate data
				7	experimentation begins with a question	6	electronic timer and release technique
				9	steps in the scientific method	6	predict which car will move fastest
				10	forming a hypothesis	6	compare results with other groups
				10	the research question and hypothesis	7	record time interval
				11	control and experimental variables	7	test the effect of one other variable
				12	importance of reliable and accurate data collection	7	design your own experiment
				12	writing lab procedures	7	doing a controlled experiment
				19	design your own experiment	7	perform your own experiment
				19	design your own experiment	7	compare results with hypothesis
				20	finding variability in data	9	design three experiments using car and ramp
				24	interpretations of patterns in data	9	devise a hypothesis
				24	making a graph	9	design three experiments and choose technology
				26	creating graphs	9	construct a data table
				26	independent and dependent variables	9	collect speed data
				27	reading a graph	10	conduct car/ramp experiment
				28	identifying cause and effect relationships		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				41	identify cause and effect	11	graph speed vs. position
				41	make a graph	11	analyze speed change of car
				42	analyze a speed/distance graph	12	understand and use data table
				42	interpreting distance/time graph	13	graph distance vs. time
				42	devise an experiment	14	record three different time intervals
				78	analyze lever diagram	15	interpret a speed vs. time graph
				79	look at force data and decide the usefulness of a machine	15	construct a quantitative graphical model
				429	why haven't we run out of water	16	decide how to vary the force on the car for this experiment
				434	what is in your tap water	16	investigate Newton's 2nd law
				435	making observations and asking questions	17	record times
				437	what is acid rain	17	record results in data table
				438	what causes acid rain	18	use data to describe relationship between force and motion
				441	why are oceans salty	18	study data table for relationship between force and motion
				448	forming a hypothesis and testing through experimentation (#5)	18	organize different combinations of data
				448	describe steps you would take to determine whether pH affects frog population		
				451	what is temperature		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				456	asking questions pertaining to specific heat and heat flow	19	use data to infer correct relationship between variables
				456	determining effect of changing mass on temperature changes	21	determine effect of increasing mass
				459	heat equation	24	collect weight data
				460	thermal equilibrium	24	use data table to record results
				472	why is Earth's atmosphere different from other planets	25	create a mathematical model
				473	why do ears pop	25	analyze block and tackle data
				476	atmospheric pressure at various altitudes graph	25	collect force data
				485	what percentage comes from this source? (problem 4)	26	what variables can be changed?
				486	observing an aurora	27	analyze lever equilibrium data
				492	why does Earth have seasons	27	use data table to record results
				497	factors that shape the weather	27	recognize variables
				501	how does rain form	27	write down the number of weights you use
				509	how do animals survive in the desert	27	think about the variables
				515	what is a carbon sink	27	find math rule for lever equilibrium
				530	proving hypotheses for sea-floor spreading	28	derive a math formula
						30	interpret block and tackle data

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				534	why doesn't Earth get bigger and bigger	30	record ropes and pulley data in table
				543	determining distance to an epicenter	34	investigate motion on a rollercoaster
				547	what explains the difference in density? (#5)	34	where does the marble move the fastest?
				547	average density (#5)	35	does data support hypothesis?
				580	form a hypothesis (#7)		
				588	what causes eclipses	36	collect precise speed and height data
				602	identify question, hypothesis, procedure, and results (#1)	36	organize data into a table
				605	how big is Earth?	37	organize data into a graph of speed vs. height
				608	relationship between orbital speed and distance between two objects	40	choose circuit parts to light a bulb
				618	average distance from the sun	43	how did A and B tapes acquire different charge?
				621	is Pluto a planet	45	did battery voltage change?
				630	what evidence was used to predict the existence of the Kuiper Belt?	51	graph voltage vs. current
				630	use the data to answer the questions	75	collect mass and amplitude data
				645	inverse square law	75	perform self-designed experiment
				645	apparent brightness vs. distance graph	75	investigate variables that affect the period of a pendulum
						75	design pendulum experiment

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				651	use the diagram to answer the questions (#2)	75	plan three experiments to determine which variable affects the period of a pendulum
				651	arrange the items in the table (#3)	75	create data table for self-designed experiment
				651	use the diagram to answer the questions (#4)	76	analyze pendulum data
				652	analysis with a spectrometer (#4)	121	graph mass vs. volume
						141	build models of Na and Cl and use them to explain bonding
						146	record detailed observations
						147	students analyze chemical change lab results
						147	organize observations into a category table
						150	record data as you perform experiment
						151	perform the experiment you designed
						151	design experiment to find out if mass is conserved
						151	explain how hypothesis compares to results
						151	design a data table
						151	does your experiment agree with law of conservation of mass?

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
						170	which factor will produce fastest dissolving rate?
						170	which method will give fastest dissolving rate?
						170	what three factors influence dissolving rate?
						170	devise hypothesis and explain
						170	write a procedure
						170	devise hypothesis and explain
						171	use data table for observations
						171	average dissolving rate
						171	collect time data and record observations
						181	organize water quality data into a table
						182	making detailed observations
						182	formulate hypothesis
						182	simulating the effect of acid rain on daphnia
						182	observing daphnia and recording movements and behavior
						182	making hypotheses and testing them against observations

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
						184	collecting pH readings while adding carbon dioxide
						185	constructing a graph of drops of acid vs pH
						185	analyzing the results of the buffered acid experiment
						186	measure temperature
						186	collecting temperature data
						187	find equation for trend line
						187	construct a graphical model
						188	conducting investigation of efficiency of immersion heater
						189	construct a temperature vs. time graph
						189	collecting time and temperature data
						190	effect of changing mass on data
						190	effect of changing mass on collected data
						193	explaining efficiency of heat transfer based on data
						193	conducting experiments on heat transfer

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
						193	collecting and recording time and temperature data
						196	writing a procedure for constructing a pointer for an aneroid barometer
						197	constructing a graph from atmospheric pressure data
						197	calculating error between your barometer and a commercial barometer
						197	identifying relationships between air pressure and weather
						197	evaluating your aneroid barometer design
						199	importance of good record keeping in order to avoid error
						199	collecting Schönbein strips for detecting ozone
						202	collecting data of temperature and sensations
						203	graphing water and ice temperature readings
						205	investigating how specific heat of water regulates Earth's temperature

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
						206	constructing a graph of time vs. temperature
						206	collecting temperature and time data
						206	identifying relationship between percent of Earth covered in water and temperature range
						208	testing hypothesis of why seasons occur against your observations in the investigation
						208	formulate a hypothesis about why the seasons occur
						210	collecting qualitative data of light intensity at scale distance from the sun
						211	determining whether distance from light source or axial tilt plays a more significant role in causing the seasons
						214	develop a procedure to create an underwater spring
						217	collecting wet and dry bulb temperature readings
						217	determining relationship between temperature of the atmosphere and relative humidity

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
						218	interpreting Doppler radar images
						224	reconstruct a series of events from clues
						224	sequencing events
						231	evaluating your completed bathymetric map
						233	identifying how the earthquake model represents an earthquake
						235	concluding which conditions affect the timing and duration and intensity of an earthquake based on observation
						235	interpreting how the drumming affects the intensity of the earthquake in the model
						237	develop a research plan for studying volcanoes
						237	finding a pattern of volcanoes on a bathymetric map
						241	justify which scenario was most likely
						243	recording observations of crystal growing
						247	evaluate your ability to interpret rock formations

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
						249	using your sundial to collect accurate data
						251	recording the changes in the moon over a month
						253	calibrating your telescope
						256	investigation discovering relationship between orbital speed and distance
						257	inverse square law
						268	discovering the mathematical relationship between apparent brightness and distance

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
GEN03.1	Unifying Threads of Understanding	Science and Technology	Develop on understanding of technology, the ability to perform technological design, and on understanding of the connection between science and technology.	73	relationship between science and technology	194	design and construct an aneroid barometer
				74	sample engineering problem		
				433	the clean water act		
				439	catalytic converters and scrubbing reduce acid rain		
				483	hydrogen powered cars		
				530	using echo sounders to map the sea floor		
				538	what we can learn from seismographs		
				544	understanding earthquakes allows engineers to design safer buildings		
				597	using satellite technology		
				599	space shuttle		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
GEN04.1	Unifying Threads of Understanding	Science Personal and Social Perspectives	Develop on understanding of personal and community health; population growth; natural and human induced hazards; science and technology in local, national and global challenges; careers in science and technology.	333	problems with disposing of plastics	163	economic impact of end-product of combustion reaction
				355	recycling tires	163	too much CO ₂
				356	recycling discarded tires	163	consider a vehicle's fuel economy
				364	petroleum	163	research how trees offset accumulation of CO ₂
				368	limiting reactants	164	perform water quality tests
				379	hydrogen-powered cars and the environment	178	wise use of water supply
				379	research fuel cells	179	maintaining water supply quality
				379	research economic impact of fuel cells	180	save water for houseplants
				379	research environmental impact of fuel cells	180	perform water quality tests
				379	research fuel cells	182	investigate effect of acid rain on microorganisms
				392	storage of nuclear waste	201	research the causes of ozone in the lower atmosphere
				395	fossil fuels		
				400	problems caused by airborne pollutants		
				400	economic impact of pollution		
				400	economic impact of reducing air pollution		
				414	effect of electrical generating facilities on dissolved oxygen in water		
				432	water cycle and conservation		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				433	wise use of water		
				435	water usage and quality		
				436	effect of excess nitrates on environment		
				437	acid rain explained		
				448	research economic impact of producing gases that cause acid rain		
				448	research the issue of acid rain		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS01.02 9-12	Physical Science Content	The learner will construct an understanding of mechanics.	Analyze forces and their relationship to motion, Newton's Three Laws of Motion.	45	Newton's first law summarized	16	2nd law
				45	Newton's second law summarized	16	unbalanced forces and acceleration of car
				45	Newton's third law summarized	20	investigate effect of gravity on motion
				46	force has potential to change motion	20	force and motion with car and ramp
				48	Newton's laws explained and applied	21	effect of friction on the car
				48	Newton's first law in detail	22	car and ramp and Newton's 3rd law
				49	force is related to acceleration		
				49	Newton's second law in detail		
				50	Newton's second law applied		
				51	balanced and unbalanced forces		
				51	net force explained		
				52	the effect of gravity		
				56	friction explained		
				59	Newton's third law in detail		
				64	research effect of friction on human joints		
				64	solving problems using $f=ma$		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				599	Newton's first law of motion and the space shuttle		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS01.03 9-12	Physical Science Content	The learner will construct an understanding of mechanics.	Analyze the conservation of energy and work: through work, power, kinetic energy, potential energy, and conservation of mechanical energy.	68	compound machines	29	design and construct complex gear machines
				83	how to calculate work	31	calculate work done on block
				84	work input and output	37	investigating conservation of energy with rollercoaster
				86	power explained	38	conservation of energy and energy transformations
				86	how to calculate power	39	make an energy flow chart
				87	concept of energy as stored work	191	calculating work input and work output
				88	potential and kinetic energy explained	191	power of an immersion heater
				90	conservation of energy explained	263	calculate the power output of a photovoltaic cell
				91	following an energy transformation		
				91	understand basic forms of energy		
				91	following an energy transformation		
				91	energy conversions		
				92	energy transformations and conservation		
				93	different forms of energy described		
				96	prove that energy is conserved		
				96	decide whether or not work is done		
				96	calculate work done		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				97	calculate work accomplished by a motor		
				97	calculate power		
				97	analyze power of motor		
				97	calculate power of two different machines		
				97	compare different amounts of work done		
				138	how to calculate electrical power		
				537	potential energy transformed to kinetic energy causes earthquakes		
				623	energy from the sun		
				626	harnessing the sun's energy		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS02.01 9-12	Physical Science Content	The learner will build an understanding of thermal energy.	Assess molecular motion as it relates to temperature and phase changes: thermal energy, expansion and contraction, temperature, phase change, heats of fusion and vaporization, and specific heat.	284	states of matter and arrangement of molecules	118	investigate melting
				284	changes of state	118	molecules in a liquid
				285	characteristics of matter related to its state	119	energy and phase changes
				405	molecular structure of ice	188	relationship between heat and temperature
				406	hydrogen bonding and the gaseous state of water	188	investigate the increase of temperature of water as thermal energy is added
				451	temperature is a measure of average kinetic energy		
				451	increasing temperature means increasing motion of molecules	190	calculating thermal energy in calories
				452	molecular motion increases when temperature increases	192	investigate convection in liquids
				454	temperature and thermal energy and heat	203	investigate the temperature/time curves as water is cooled through a phase change to ice
				454	changes in temperature are directly related to changes in energy	204	investigating latent heat and thermal buffering
				455	definition of calorie	204	compare the shape of the water line and the ice line on the temperature/time graph
				456	definition of specific heat		
				458	water's specific heat helps regulate Earth's temperature	205	investigating how the high specific heat of water helps regulate Earth's temperature
				459	heat equation		
				461	thermal conductivity explained		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				462	densely packed solids are good conductors of heat		
				462	heat transfer through air		
				463	warming hands over candle		
				463	convection currents and weather		
				464	convection currents in water		
				465	solid road surface emits radiation		
				465	transfer of heat by radiation		
				482	global warming and heat transfer by radiation		
				493	apply knowledge of heat transfer to different situations		
				498	phases changes in the atmosphere		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS02.02 9-12	Physical Science Content	The learner will build an understanding of thermal energy.	Analyze the conservation of the total amount of energy, including heat energy, in a closed system; the First Law of Thermodynamics.	88 90 92 93 96	potential and kinetic energy explained conservation of energy explained energy transformations and conservation different forms of energy described prove that energy is conserved	37 38 147	investigating conservation of energy with rollercoaster conservation of energy and energy transformations feel the heat generated by chemical reaction
PS02.03 9-12	Physical Science Content	The learner will build an understanding of thermal energy.	Analyze the Second Law of Thermodynamics: heat will not flow spontaneously from a cold to a hot body, and it is impossible to build a machine that does nothing but convert heat into useful work.	84 85 85 85 92 96 97 97	work input and output efficiency explained efficiency and bicycles some input work is converted to heat where does "spent" energy go? explain the "lost" energy find the efficiency of a machine calculate work output from efficiency data	191	find efficiency of water heater

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS03.01 9-12	Physical Science Content	The learner will construct an understanding of electricity and magnetism.	Analyze the nature of static electricity and the conservation of electrical charge: positive and negative charges, and opposite charges attract and like charges repel.	105 106 107 108 108	charge is a fundamental property of matter static charge discussed explanation of coulomb how an electroscope works electroscopes		
PS03.02 9-12	Physical Science Content	The learner will construct an understanding of electricity and magnetism.	Analyze the electrical charging of objects due to the transfer of electrons by friction, induction, or conduction.	105 106 107 108 108 114 114 115 171	charge is a fundamental property of matter static charge discussed explanation of coulomb how an electroscope works electroscopes voltage and potential energy voltage is related to potential energy how to measure voltage electromagnetic induction explained	73 73	use magnetic induction to create an electric field exploring electric generators

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS03.03 9-12	Physical Science Content	The learner will construct an understanding of electricity and magnetism.	Analyze direct current electrical circuits: electrical potential difference, resistance, Ohm's Law, simple direct current circuits, series circuit, and parallel circuit.	101	concept of electric current	45	battery chemicals and electrical charge
				102	concept of electric circuits	48	measuring resistance
				103	circuit diagrams	50	Ohm's law
				113	battery uses chemical energy to produce electrical charge	56	build a parallel circuit
				114	voltage and potential energy	56	build a series circuit
				115	how to measure voltage	57	compare brightness of bulbs in series vs. parallel
				117	electrical current explained	58	build a series circuit and find total resistance
				119	how to measure current	60	parallel circuit and Ohm's law
				120	ground fault circuit interrupter	61	compare current and voltage and resistance in each type of circuit
				123	understand the concept of electrical resistance		
				128	find and investigate circuit breakers in the home		
				131	Ohm's law explained		
				132	using Ohm's law to analyze circuits		
				136	potentiometer explained		
				145	series circuit defined		
				145	holiday lights as series or parallel		
				145	parallel circuit defined		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				145	single path vs. branching paths		
				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		
PS03.04 9-12	Physical Science Content	The learner will construct an understanding of electricity and magnetism.	Analyze the practical applications of magnetism and its relationship to the movement of electrical charge.	159	magnetism explained	62	describing forces that magnets exert on each other
				163	understanding magnetic fields	64	testing materials to see if they are affected by magnets
				164	what is an electromagnet?	66	build an electromagnet
				166	building an electromagnet	66	compare electromagnets and permanent magnets
				166	increased current vs. strength of magnetic field	67	find out what happens to strength of electromagnet when current is increased
				168	how electric motors work	68	investigate how an electric motor works
				170	dissecting an electric motor	73	use magnetic induction to create an electric field
				171	electromagnetic induction explained	73	exploring electric generators

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS03.05 9-12	Physical Science Content	The learner will construct an understanding of electricity and magnetism.	Analyze permanent magnetism and the practical applications of the characteristic of permanent magnets.	159 163	magnetism explained understanding magnetic fields	62 64 66	describing forces that magnets exert on each other testing materials to see if they are affected by magnets compare electromagnets and permanent magnets
PS04.01 9-12	Physical Science Content	The learner will develop an understanding of wave motion and the wave nature of sound and light.	Analyze the characteristics of waves: wavelength, frequency, period, amplitude.	179 182 182 184 192 219 221 242	what is a cycle? concept of frequency explained concept of period explained understanding graphs of harmonic motion analyze systems to find cycle/period/frequency frequency of sound and pitch importance of wavelength of sound waves color and frequency of light waves	265	an element's spectral lines correspond to specific wavelengths of light

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS04.02 9-12	Physical Science Content	The learner will develop an understanding of wave motion and the wave nature of sound and light.	Analyze the phenomena of reflection, refraction, interference and diffraction.	201	waves and refraction	85	observing reflection in water waves
				201	waves and reflection	87	investigating resonance
				201	reflection in water waves and light waves	88	natural frequency and resonance of standing waves on a string
				201	waves and absorption		
				202	refraction and eyeglasses	95	investigate interference with sound waves
				204	resonance explained		
				206	constructive and destructive interference	96	investigating sound resonance
				210	can wave interference sink a ship?	102	polarization of water waves
				210	natural frequency of a building and earthquakes	102	polarization of a spring wave
				223	interference of sound waves	103	polarization of light
				225	consonance and dissonance and beats	106	tracing incident and reflected rays
				240	polarization of light	106	investigate reflection of light
				242	color and frequency of light waves	107	plot reflected rays from a mirror
				245	we see color in terms of reflected light	107	investigate how light interacts with mirrors
				258	forming images with lenses	108	tracing incident and refracted rays
				258	refraction in optical systems	108	explore refraction with lenses
				260	reflection and mirrors	108	investigate how light interacts with a prism

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				261	refraction and lenses	108	explore refraction with a prism
				263	index of refraction	253	using a retractive telescope
				263	index of refraction		
				273	find the angle of reflection	265	an element's spectral lines correspond to specific wavelengths of light
PS04.03 9-12	Physical Science Content	The learner will develop an understanding of wave motion and the wave nature of sound and light.	Compare and contrast the frequency and wavelength of sound produced by a fixed source with a moving source of sound, the Doppler Effect.	213	how the ear works	90	investigate human perception of sound
				217	loudness and decibels	90	investigate human perception of sound
				219	frequency of sound and pitch	98	investigate sound and music
				220	white noise		
				220	sonograms		
				220	voice recognition programs		
				222	effect of temperature on speed of sound wave		
				222	effect of medium on speed of sound wave		
				226	musical instruments		
				648	the Doppler effect		
PS05.01 9-12	Physical Science Content	The learner will build an understanding of the structure and properties of matter.	Analyze development of current atomic theory's: Dalton, J.J. Thompson, Rutherford, and Bohr.	313	development of atomic theory	130	investigate Rutherford's gold foil experiment
				324	research and create a poster to illustrate development of atomic model		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS05.02 9-12	Physical Science Content	The learner will build an understanding of the structure and properties of matter.	Examine the nature of atomic structure: Protons, Neutrons, Electrons, Atomic mass, Atomic number, and Isotopes.	311	location/size/charge of subatomic particles	133	exploring isotopes
				311	protons/neutrons/electrons	133	identify atomic number
				315	atomic number discussed	133	identify mass number
				315	atoms of same element have same atomic number	133	identify element symbol and name
				316	isotopes explained	133	protons and neutrons
				316	mass number discussed	133	location of electrons in atom
				318	proton/electron attraction	136	understanding isotopes
				322	atomic mass on the periodic table	136	mass number
				322	atomic number on the periodic table	136	atomic number
				322	mass number on the periodic table	137	build atomic models
				322	atomic number on the periodic table	140	review subatomic particles
				322	chemical symbols and element names		
				388	showing valence electrons in a diagram		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS05.03 9-12	Physical Science Content	The learner will build an understanding of the structure and properties of matter.	Describe radioactivity and its practical application as an alternative energy source: Alpha, Beta, and Gamma decay, Fission, and Fusion.	387	fusion and fission explained	160	radioactive decay
				388	nuclear vs chemical reactions		
				393	radioisotopes in science and medicine		
				393	carbon dating		
				400	research pros and cons of nuclear technology		
				623	nuclear fusion and the sun		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS05.04 9-12	Physical Science Content	The learner will build an understanding of the structure and properties of matter.	Assess the use of physical properties in identifying substances: density, specific heat, melting point, and boiling point.	281	volume and mass contrasted	116	mass and volume measurements
				284	melting and boiling point explained	124	build a density column
				284	melting and boiling points	126	investigating buoyancy with clay boats
				285	table of melting and boiling points	128	use CPO viscometer to study viscosity
				291	density explained	212	investigate density changes in the oceans as the cause of ocean layering
				291	density is independent of amount of substance		
				292	elasticity is a physical property of matter		
				292	hardness is a physical property of matter		
				293	brittleness is a physical property of matter		
				294	tensile strength is a physical property of matter		
				294	malleability is a physical property of matter		
				295	relationship between mass volume and density		
				296	density of liquid water vs. ice		
				297	buoyancy explained		
				298	sinking and floating		
				302	viscosity of motor oils		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				305	viscosity of glue mixtures		
PS05.05 9-12	Physical Science Content	The learner will build an understanding of the structure and properties of matter.	Analyze the formation of simple inorganic compounds from elements.	324	which element is more likely to combine with other elements?		
				324	use the periodic table to predict chemical formulas		
				332	metals nonmetals and metalloids		
				335	chemical bonding and the periodic table		
PS05.06 9-12	Physical Science Content	The learner will build an understanding of the structure and properties of matter.	Analyze the periodic trends in the physical and chemical properties of elements: symbols, groups (families), and periods.	320	groups of elements	141	build model of Na and Cl atoms and explain why they bond to form a molecule
				321	studying the periodic table		
				321	groups of elements and valence shells		
				329	periodic table columns and valence electrons	142	arrangement of electrons and groups of elements
				330	bonding and periodic table position		
				332	metals nonmetals and metalloids		
				332	periodic table and electronegativities		
				335	periodic table and oxidation numbers		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS06.01 9-12	Physical Science Content	The learner will build an understanding of regularities in chemistry	Identify and classify the common chemical reactions that occur in our physical environment and in our bodies: oxidation and reduction, and polymerization and depolymerization.	333	plastics	148	chemical equations
				354	chemical reactions and digestion	157	predict the products of double displacement reactions
				357	combustion reaction		
				361	chemical reactions in living systems	162	investigating combustion reactions
				361	heartburn reaction		
				378	combustion reactions		
				378	consumer chemistry		
				381	MRE ration heater reaction		
				395	chemistry of the atmosphere		
				395	chemistry of the atmosphere		
				397	carbon reactions		
				419	dissociation of water		
				438	chemical reactions and the formation of acid rain		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS06.02 9-12	Physical Science Content	The learner will build an understanding of regularities in chemistry	Identify the reactants and products and balance simple equations of various types: single replacement, double replacement, decomposition, synthesis, and combustion.	336 357 359 368 371 375 376 377 377	writing chemical formulas chemical reactions involve rearrangement of atoms balancing chemical equations predicting amount of product which of the equations is balanced? synthesis or addition reactions decomposition reactions single displacement reactions double displacement reactions	148 149 152 152 156	reactants and products practice balancing equations predict how much product formed given the reactants write the balanced equation investigate double displacement reactions
PS06.03 9-12	Physical Science Content	The learner will build an understanding of regularities in chemistry	Measure the temperature, pressure, and volume of gases and assess their interrelationship: Boyle's Law and Charles' Law.	299 300	Charles' law Boyle's law		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS06.04 9-12	Physical Science Content	The learner will build an understanding of regularities in chemistry	Analyze aqueous solutions and solubility: Ionic substances and covalent substances.	403	a water molecule is v-shaped	170	design experiments to explore dissolving rate
				403	why water is a nearly universal solvent	171	what happened at the molecular level?
				403	water structure and its function as a solvent	171	investigate the dissolving process
				409	why water is called the universal solvent	172	investigate solubility of sugar
				409	dissolution at the molecular level	175	solubility and pressure
				409	dissolution of ionic compounds	181	water quality testing
				409	polar solutes	181	water quality testing
				410	dissolution of covalent compounds		
				412	solubility value		
				412	effect of nature of solvent on solubility		
				412	effect of temperature on solubility		
				413	temperature-solubility graphs		
				414	effect of temperature on solubility of gasses		
				414	effect of pressure on solubility of gasses		
				414	pressure and the solubility of gases		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
				416	SCUBA diving and effects of pressure on gasses in the bloodstream		
				417	dissolution of acids in water		
				418	dissolution of bases in water		
				419	neutralization of acids and bases		
PS06.05 9-12	Physical Science Content	The learner will build an understanding of regularities in chemistry	Assess the indicators of chemical change including: development of a gas, formation of a precipitate, and change in color.	353	physical and chemical changes and digestion	146	investigate and observe chemical and physical changes in the lab
				354	new substances are formed when a chemical change occurs	158	investigate energy changes in chemical reactions
				355	physical and chemical changes in tire recycling		
				357	chemical reactions involve rearrangement of atoms		
				364	formation of petroleum is a very slow chemical reaction		
				372	determine if changes are chemical or physical		
				381	exothermic reactions and MREs		
				382	endothermic reactions and cold packs		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS06.06 9-12	Physical Science Content	The learner will build an understanding of regularities in chemistry	Compare and contrast the composition of strong and weak solutions of acids or bases: degree of dissociation or ionization, electrical conductivity, ph, strength, and concentration.	417	properties of acids	176	investigate acids and bases
				417	H and OH ions	181	testing pH of tap water samples
				417	define and compare acids and bases	184	determining pH of water as carbon dioxide dissolves
				417	acids and bases compared/contrasted		
				418	properties of bases		
				418	strong vs. weak acids		
				419	strong vs. weak bases		
				419	weak and strong acids and bases		
				420	defining and determining pH		
				420	pH and pH scale		
				421	table of pH of common substances		
				421	pH of substances you use or consume		
				423	electrolytes and nonelectrolytes		
				423	electrolytes and nonelectrolytes		
				423	acids and bases are electrolytes		

Correlation to North Carolina Science Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Level	Strand	Competency Goal	Objective	student text pg	detail	investigation pg	detail
PS1.01 9-12	Physical Science Content	The learner will construct an understanding of mechanics.	Analyze uniform and accelerated motion: Uniform motion is motion at a constant speed in a straight line (constant velocity). The rate of change in velocity is acceleration.	14	how to calculate speed	9	collect data and calculate speed of car
				15	compare and contrast speed and velocity	10	calculate speed of the car
				20	calculate speed of car	12	calculate speed of moving car
				20	find speed of bumblebee	12	find speed of car at different positions
				24	accurate speed measurements	13	make a position vs. time graph
				30	position vs. time graphs	14	calculate acceleration of car on ramp
				32	average speed vs. instantaneous	14	calculate speed of car at two places on the ramp
				32	average speed discussed	15	make a speed vs. time graph
				33	understanding acceleration	17	explore 2nd law and acceleration
				35	how to calculate acceleration	17	calculate speed of car
				36	examples of acceleration	36	find speed of marble
				37	speed vs. time graphs		
				41	find acceleration of car		
				42	calculate speed from distance/time graph		
				49	link between force and acceleration		
				53	acceleration due to gravity		