Miami-Dade County Public Schools

Curriculum and Instruction (Science)

CURRICULUM PACING GUIDE

HONORS EARTH/SPACE SCIENCE

REVISED **AUGUST 2008**

The School Board of Miami-Dade County Public Schools

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Miami-Dade County Public Schools
Curriculum and Instruction (Science)

Miami-Dade County Public Schools
Curriculum and Instruction (Science)
Secondary Science Curriculum Pacing Guide

Background

This document was created by the Curriculum and Instruction (Science) staff in collaboration with classroom science teachers. Its purpose is to align the science curriculum and provide uniformity within each school as well as within the district. In recognition of the diversity among students, this Curriculum Pacing Guide may be modified to address individual needs. In such cases, sufficient time should be allocated to each of the relevant benchmarks with an emphasis placed on those that are annually assessed.

This document addresses all benchmarks that are relevant to this course. It is meant to be utilized in conjunction with district and state curricular materials (e.g., Test Item and Performance Task Specifications, Florida Sunshine State Standards (FSSS), Competency-Based Curriculum (CBC), and science resources found on the science district website).

Document Layout

The document has been organized with the following column headings:

- **Topic:** Provides in outline form a general overview of the topics and the depth of subject matter to be covered.

- **FSSS Alignment/CBC Alignment:** Contains the state benchmarks and a narrative for each, which identifies whether it is annually assessed (AA), content sampled (CS,) or embedded (Assessed As). Below the benchmark are the corresponding CBC numbers.

- **Vocabulary:** Provides teachers with the vocabulary needed for FCAT preparation.

- **Activities/Labs/Resources**: Provides suggested activities, labs, and resources needed to actively engage students in an inquiry-based, hands-on curriculum as they master the benchmarks. Some of the resources include:
  - **Essential Labs (EL):** Students should successfully complete these minimally required lab experiences prior to exiting this science course.
  - **Interactive Websites:** These sites offer students and/or teachers active features in which to participate.
    - **ExploreLearning Gizmos:** The site www.explorelearning.com offers students and teachers interactive activities that allow for a deeper exploration of science concepts to engage students and deliver content.
    - **Riverdeep:** Available through the district's website and accessed using student identification numbers.
  - **Resources found in the district's science website** (http://science.dadeschools.net/default.html), such as the Activities Packet (AP) and Resource Guides (RG).

- **Textbook Alignment**: Content is aligned to the adopted textbook for the specific course.

- **Next Generation Sunshine State Standards:** Provides a correlation between the existing FSSS Benchmarks in the second column to the new science standards. **These new standards will be assessed in 2012.**

    - The Department of Education recognized the need for a systematic approach to review and revise all of the academic standards, and on January 17, 2006, the State Board of Education adopted a six-year cycle that set forth a schedule for the regular review and revision of all K-12 content standards. This move set the stage for higher levels of rigor and higher academic achievement for years to come. Eighteen Big Ideas thread throughout all grade levels and build in rigor and depth as students advance. Each grade level includes benchmarks from the four Bodies of Knowledge (Nature of Science, Life Science, Earth Science, and Physical Science). The rollout of the new standards for M-DCPS will occur over a three year cycle 2008-2011. Year one will be awareness of the new standards, followed by the replacement of the old SSS at targeted grade levels each year as described below:

        Year 1: 2008 - 2009 - Awareness for all grades
        Year 2: 2009 - 2010 - Grades K, 3, 6, 9
        Year 3: 2010 - 2011 - Grades 1, 4, 7, 10
        Year 4: 2011 - 2012 - Grades 2, 5, 8, 11

Message to Teachers

Every nine weeks, one week should be designated as "Project Week." That week should provide opportunities for review, remediation, and enrichment, which may be achieved through individual and/or group projects or through other activities that teachers choose to use.

The Nature of Science Strand (H Strand) from the Sunshine State Standards is infused throughout the year in all science courses. These benchmarks sometimes have been explicitly cited in the document; however, it is expected that teachers infuse them frequently in every activity.

Acknowledgements

Curriculum and Instruction (Science) would like to acknowledge the effort of all the teachers that have worked arduously and diligently in the preparation and the updating of all the Curriculum Pacing Guides throughout the years.

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High School Science: Curriculum Pacing Guide for Earth/Space Science Honors

First Nine Weeks

Topic	FSSS/CBC Alignment	Vocabulary (FCAT Terms in Bold)	Suggested Strategies for Lesson Development	Activities/Lab/ Resources	Textbook Alignment	Next Generation Sunshine State Standards
Introduction to Earth/Space Science **Lab Safety**	**SC.H.1.4.1** The student knows that investigations are conducted to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories. **AA** **SC.H.1.4.4** The student knows that scientists in any one research group tend to see things alike and that therefore scientific teams are expected to seek out the possible sources of bias in the design of their investigations and in their data analysis. **SC.H.1.4.5** The student understands that new ideas in science are limited	astronomy equipment geology lab safety lab supplies meteorology oceanography	**The student will be able to:** • identify the four branches of Earth Space Science • identify and utilize basic lab equipment • implement proper lab safety procedures **Teaching Strategies:** • complete concept map, activating students' prior knowledge on Earth Space Science • research a career and write a paragraph on each or use a CRISS strategy/ graphic organizer • discuss lab safety, importance, and procedures • watch film on lab safety • sign lab safety contract	**Lab Safety Rules** *(AP page 4) **Lab Safety** *(TX page xviii) **LC: Scientific Revolutions** *(TX page 7)	**Preface Pages xviii – xxi** **Chapter 1**	**SC.912.N.1.1** Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: o pose questions about the natural world, o conduct systematic observations, o examine books and other sources of information to see what is already known, o review what is known in light of empirical evidence, o plan investigations, o use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), o pose answers, explanations, or descriptions of events, o generate explanations that

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	by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring from unexpected findings, and usually grow slowly from many contributors. **SC.H.1.4.7** The student understands the importance of a sense of responsibility, a commitment to peer review, truthful reporting of the methods and outcomes of investigations, and making the public aware of the findings. **SC.H.2.4.2** The student knows that scientists control conditions in order to obtain evidence, but when that is not					explicate or describe natural phenomena (inferences), o use appropriate evidence and reasoning to justify these explanations to others, o communicate results of scientific investigations, and o evaluate the merits of the explanations produced by others. **SC.912.N.1.2** Describe and explain what characterizes science and its methods. **SC.912.N.2.1** Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science). **SC.912.N.2.2** Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.

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	possible for practical or ethical reasons, they try to observe a wide range of natural occurrences to discern patterns. **SC.H.3.4.3** The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events. **CBC: I.1.A, I.4.A, I.5.A, I.6.A, I.7.A**					**SC.912.N.2.3** Identify examples of pseudoscience (such as astrology, phrenology) in society. **SC.912.N.2.4** Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. *There are no benchmarks that pertain directly to Lab Safety, however, appropriate safety procedures should be introduced and reinforced throughout the length of the course.*
Introduction to Earth/Space Science continued	**SC.H.1.4.1** The student knows that investigations are conducted to explore	**accuracy** **density** **mass** **precision**	**The student will be able to:** • measure various properties of matter (e.g.	**Chocolate Chip Cookie Lab** *(AP page 6)	**Chapter 1** **SI Reference**	**SC.912.N.1.2** Describe and explain what characterizes science and its methods.

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Measurement • **Metric System** • **Unit conversion** • **Scientific notation**	new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories. **AA** **SC.H.1.4.4** The student knows that scientists in any one research group tend to see things alike and that therefore scientific teams are expected to seek out the possible sources of bias in the design of their investigations and in their data analysis. **SC.H.1.4.5** The student understands that new ideas in science are limited by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring	scientific notation SI unit **volume**	length, volume, mass, density, and temperature) • convert between units of the metric system • convert numbers from standard notation to scientific notation **Teaching Strategies:** • perform provided laboratory activities • practice problems on unit conversions and scientific notation • review the concepts and appropriate use of scientific prefixes and conversions	**Free Fall** *(RG) **Density Laboratory** *(GZ) **Skills Handbook** *(TX page 820) **Sample Size and Accuracy** *(TX page 12)	**Table Page 870**	**SC.912.N.1.4** Identify sources of information and assess their reliability according to the strict standards of scientific investigation.

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	from unexpected findings, and usually grow slowly from many contributors. **SC.H.1.4.7** The student understands the importance of a sense of responsibility, a commitment to peer review, truthful reporting of the methods and outcomes of investigations, and making the public aware of the findings. **SC.H.2.4.2** The student knows that scientists control conditions in order to obtain evidence, but when that is not possible for practical or ethical reasons, they try to observe a wide range of natural occurrences to discern patterns.					

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	SC.H.3.4.3 The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events. **MA.B.3.4.1 The student** solves real-world and mathematical problems involving estimates of measurements, including length, time, weight/mass, temperature, money, perimeter, area, and volume, and estimates the effects of measurement errors on calculations. **MA.B.4.4.1** determines the level of accuracy and precision, including					

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	absolute and relative errors of tolerance, required in real-world measurement situations. **MA.D.1.4.1** The student describes, analyzes, and generalizes relationships, patterns, and functions using words, symbols, variables, tables, and graphs. **CBC: I.1.A, I.4.A, I.5.A, I.6.A, I.7.A**					
Introduction to Earth/Space Science continued **Scientific Method**	**SC.H.1.4.1** The student knows that investigations are conducted to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories. **AA** **SC.H.1.4.4** The student knows that	control **dependent** hypothesis **independent** law **scientific method** theory **varible**	**The student will be able to:** • utilize the scientific method to solve real world problems and laboratory experiments • identify and explain the components of the scientific method **Teaching Strategies:** • perform provided laboratory activities • create a foldable	**Sunset in a Bag** *(AP page 8) **Scientific Methods** *(CD) **Making Observations** *(CD) **What's Before Your Eyes** *(CD) **LC: Ice Cores and**	**Chapter 1**	**SC.912.N.1.1** Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. pose questions about the natural world, 2. conduct systematic observations, 3. examine books and other sources of information to see what is already known,

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	scientists in any one research group tend to see things alike and that therefore scientific teams are expected to seek out the possible sources of bias in the design of their investigations and in their data analysis. **SC.H.1.4.5** The student understands that new ideas in science are limited by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring from unexpected findings, and usually grow slowly from many contributors. **SC.H.1.4.7** The student understands the importance of a sense of responsibility, a		booklet illustrating the main components of the scientific method • use CRISS strategies (e.g. two-column notes, concept maps) to emphasize scientific method • participate in district wide Science Fair ***Scientific Method components, such as independent and dependent variable, controls, appropriate number of trials, etc. should be integrated in activities throughout the year.***	**Climate** *(CD)		4. review what is known in light of empirical evidence, 5. plan investigations, 6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), 7. pose answers, explanations, or descriptions of events, 8. generate explanations that explicate or describe natural phenomena (inferences), 9. use appropriate evidence and reasoning to justify these explanations to others, 10. communicate results of scientific investigations, and 11. evaluate the merits of the explanations produced by others. **SC.912.N.1.2** Describe and explain what characterizes science and its methods.

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	commitment to peer review, truthful reporting of the methods and outcomes of investigations, and making the public aware of the findings. **SC.H.2.4.2** The student knows that scientists control conditions in order to obtain evidence, but when that is not possible for practical or ethical reasons, they try to observe a wide range of natural occurrences to discern patterns. **SC.H.3.4.3** The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of					**SC.912.N.1.3** Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented. **SC.912.N.1.4** Identify sources of information and assess their reliability according to the strict standards of scientific investigation. **SC.912.N.1.5** Describe and provide examples of how similar investigations conducted in main parts of the world result in the same outcome. **SC.912.N.1.6** Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.

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	events. **CBC: I.1.A, I.4.A, I.5.A, I.6.A, I.7.A**					**SC.912.N.1.7** Recognize the role of creativity in constructing scientific questions, methods and explanations. **SC.912.N.3.5** Describe the function of models in science, and identify the wide range of models used in science. **SC.912.N.4.2** Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
Earth's Chemistry **Atomic Structure** • **Protons, Neutrons, and Electrons** • **Elements, Ions,**	**SC.A. 1.4.1** The student knows that the electron configuration in atoms determines how a substance reacts and how much energy is involved in its reactions.	atom **atomic mass** atomic number **electron** element energy level ion isotope mass number matter	**The student will be able to:** • describe the particles within atoms and the structure of atoms • relate the energy levels of atoms to the chemical properties of elements • define the concept	**Physical Properties of Elements** *(TX page 98) **LC: The Smallest Particles** *(TX page 101)	**Chapter 4**	**SC.912.P.8.1** Differentiate among the four states of matter**.** **SC.912.P.8.3** Describe changes in the atomic model over time and why those changes were necessitated by experimental evidence.

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and Isotopes • **Energy Levels** • **States of Matter**	**SC.A.1.4.2** The student knows that the vast diversity of the properties of materials is primarily due to variations in the forces that hold molecules together. **SC.A.1.4.3** The student knows that a change from one phase of matter to another involves a gain or loss of energy. **SC.A.1.4.5** The student knows that the connections (bonds) form between substances when outer-shell electrons are either transferred or shared between their atoms, changing the properties of substances.	neutron nucleus proton valence electron	of isotopes and radioactivity • describe and explain the states of matter on Earth • relate the role of energy to changes in the states of matter **Teaching Strategies:** • perform provided laboratory activities • create a foldable booklet illustrating the main components of the structure of an atom and the states of matter • use CRISS strategies (e.g. two-column notes, concept maps, VENN diagrams) to emphasize atomic structure • elicit prior knowledge by using a KWL on atoms			**SC.912.P.8.4** Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom. **SC.912.P.8.5** Relate properties of atoms and their position in the periodic table to the arrangement of their electrons. **SC.912.P.8.6** Distinguish between bonding forces holding compounds together and other attractive forces including hydrogen bonding and Van der Waals forces. **SC.912.P.8.7** Interpret formula representations of molecules and compounds in terms of composition and structure.

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	SC.A.2.4.1 The student knows that the number and configuration of electrons will equal the number of protons in an electrically neutral atom and when an atom gains or loses electrons, the charge is unbalanced. **SC.A.2.4.2** The student knows the difference between an element, a molecule, and a compound. **SC.H.1.4.5** The student understands that new ideas in science are limited by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring from unexpected					**SC.912.P.10.10** Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear)

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	findings, and usually grow slowly from many contributors. **CBC: I.1.A, I.5.A, III.1.A**					
Earth's Chemistry **Periodic Table**	**SC.A. 1.4.1** The student knows that the electron configuration in atoms determines how a substance reacts and how much energy is involved in its reactions. **SC.A.1.4.2** The student knows that the vast diversity of the properties of materials is primarily due to variations in the forces that hold molecules together. **SC.A.1.4.5** The student knows that the connections (bonds) form between substances when outer-shell electrons are either	atom **atomic mass** atomic number **chemical property** **electron** element energy level family groups ion isotope mass number neutron nucleus periods physical property proton symbol valence electron	**The student will be able to:** • describe the arrangement of elements on the periodic table • identify physical properties of elements and locate elements on the periodic table • investigate trends among periods and groups within the periodic table • relate the energy levels of atoms to the chemical properties of elements **Teaching Strategies:** • perform provided laboratory activities • create a foldable booklet illustrating the main components of the structure of an atom and the states of matter • use CRISS strategies (e.g. two-column	**Alien Periodic Lab Activity** *(RG page 92) **Periodic Trends Activity** *(RG page 97) **Using the Periodic Table** *(TX page 83) **Element Resources in the US** *(TX page 100)	**Chapter 4**	**SC.912.P.8.1** Differentiate among the four states of matter**.** **SC.912.P.8.4** Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atoms. **SC.912.P.8.5** Relate properties of atoms and their position in the periodic table to the arrangement of their electrons. **SC.912.P.8.6** Distinguish between bonding forces holding compounds together and other attractive

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	transferred or shared between their atoms, changing the properties of substances. **SC.A.2.4.1** The student knows that the number and configuration of electrons will equal the number of protons in an electrically neutral atom and when an atom gains or loses electrons, the charge is unbalanced. **SC.A.2.4.2** The student knows the difference between an element, a molecule, and a compound. **SC.A.2.4.5** The student knows that elements are arranged into groups and families based on similarities in electron structure		notes, concept maps, VENN diagrams) to emphasize atomic structure • elicit prior knowledge by using a KWL on elements • create an alternative arrangement for the periodic table based on other properties			forces including hydrogen bonding. **SC.912.P.8.7** Interpret formula representations of molecules and compounds in terms of composition and structure.

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Topic	FSSS/CBC Alignment	Vocabulary (FCAT Terms in Bold)	Suggested Strategies for Lesson Development	Activities/Lab/ Resources	Textbook Alignment	Next Generation Sunshine State Standards
	and that their physical and chemical properties can be predicted. AA **SC.H.1.4.5** The student understands that new ideas in science are limited by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring from unexpected findings, and usually grow slowly from many contributors. **CBC: I.2.A, I.3.A, I.5.A, III.1.A, III.2.E**					
Earth's Chemistry **Chemical Bonds** • **Covalent** • **Ionic** • **Metallic**	**SC.A. 1.4.1** The student knows that the electron configuration in atoms determines how a substance reacts and how much energy is	**chemical bond** **chemical property** **chemical reaction** **compound** **covalent bond** **electron**	**The student will be able to:** • describe the chemical bonds that unite atoms to form compounds • relate the nature of chemical bonds that hold compounds together to the	**Sunset in a Bag** ***** (AP page 8)	**Chapter 4**	**SC.912.P.8.1** Differentiate among the four states of matter**.** **SC.912.P.8.4** Explore the scientific theory of atoms (also known as atomic theory) by describing

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Mixtures and Solutions	involved in its reactions. **SC.A.1.4.2** The student knows that the vast diversity of the properties of materials is primarily due to variations in the forces that hold molecules together. **SC.A.1.4.4** The student experiments and determines that the rates of reaction among atoms and molecules depend on the concentration, pressure, and temperature of the reactants and the presence/ absence of catalysts. **AA** **SC.A.1.4.5** The student knows that the connections (bonds) form between substances when outer-shell electrons are either transferred or shared	energy level ion ionic bond metallic bond molecule physical property solution valence electron	physical structures of compounds • relate the energy levels of atoms to the chemical properties of elements **Teaching Strategies:** • perform provided laboratory activities • create a foldable booklet illustrating the main components of the structure of an atom and the states of matter • use CRISS strategies (e.g. two-column notes, concept maps, VENN diagrams) to emphasize atomic structure • elicit prior knowledge by using a "Think-Pair-Share" on mixtures and solutions			the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atoms. **SC.912.P.8.5** Relate properties of atoms and their position in the periodic table to the arrangement of their electrons. **SC.912.P.8.6** Distinguish between bonding forces holding compounds together and other attractive forces including hydrogen bonding. **SC.912.P.8.7** Interpret formula representations of molecules and compounds in terms of composition and structure. **SC.912.P.10.5** Relate temperature to the average molecular kinetic energy.

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	between their atoms, changing the properties of substances. **SC.A.2.4.1** The student knows that the number and configuration of electrons will equal the number of protons in an electrically neutral atom and when an atom gains or loses electrons, the charge is unbalanced. **SC.B.1.4.1** The student understands how knowledge of energy is fundamental to all the scientific disciplines (e.g., the energy required for biological processes in living organisms and the energy required for the building, erosion, and rebuilding of Earth). **AA**					**SC.912.P.12.12** Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.

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	CBC: I.1.A, III.1.A, III.2.A					
Meteorology **Atmosphere** • **Layers** • **Composition**	**SC.B.1.4.6** The student knows that the first law of thermodynamics relates the transfer of energy to the work done and the heat transferred. **SC.B.1.4.7** The student knows that the total amount of usable energy always decreases, even though the total amount of energy is conserved in any transfer. **SC.D.1.4.1** The student knows how climatic patterns on Earth result from an interplay of many factors (Earth's topography, its rotation on its axis, solar radiation, the transfer of heat energy where the	atmosphere exosphere mesosphere **pressure** stratosphere thermosphere troposphere	**The student will be able to:** • identify the layers of the atmosphere • list the major components of the atmosphere • describe the atmosphere, including composition, layers, differences in density and pressure, and changes over time **Teaching Strategies:** • perform provided laboratory activities • create a small booklet or visual to study the general characteristics of the atmospheric layers • use CRISS strategies (e.g. two-column notes, concept maps) to emphasize topic	**Icy Boil** *(AP page 10) **Barometric Pressure** *(CD or TX page 551)	**Chapter 2** (brief introductio n) **Chapter 22**	**SC.912.P.10.2** Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity. **SC.912.E.7.7** Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.

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	atmosphere interfaces with lands and oceans, and wind and ocean currents). **AA** **SC.E.1.4.3** The student knows the various reasons that Earth is the only planet in our Solar System that appears to be capable of supporting life as we know it. **SC.H.3.4.1** The student knows that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure. **CBC: III.2.C, III.1.E, III.3.F, III.4.E**					
Meteorology	**SC.B.1.4.3** The student knows that temperature is a	albedo **radiation** temperature	**The student will be able to:** • compare the	**Energy Absorption and reflection** *(TX page 570)	**Chapter 22**	**SC.912.P.10.5** Relate temperature to the average molecular kinetic

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Solar Radiation • **Albedo** **Specific Heat**	measure of the average translational kinetic energy of motion of the molecules in an object. **SC.D.1.4.1** The student knows how climatic patterns on Earth result from an interplay of many factors (Earth's topography, its rotation on its axis, solar radiation, the transfer of heat energy where the atmosphere interfaces with lands and oceans, and wind and ocean currents). **AA** **CBC: III.2.C, III.1.E**	**thermal energy**	specific heat of various substances **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps) to emphasize topic • demonstrate differences in temperature of objects based on albedo (Outdoor Activity)	**Absorbed Solar Radiation** (TX page 572**)** **Heating and Cooling Rates of the Earth Surface** *(AP page 12)	**Chapter 25** page 634 (specific heat)	energy. **SC.912.E.7.4** Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
Meteorology **Water in the Atmosphere** • **Water Cycle**	**SC.A.1.4.3** The student knows that a change from one phase of matter to another involves a gain or loss of energy.	**change of state** coalescence **condensation** condensation nuclei dew point **evaporation**	**The student will be able to:** • diagram and explain the steps of the water cycle • calculate relative humidity using a sling psychrometer	**Cloud Formation** * (CD or TX page 584) **Cloud in a Jar** http://schoolscience.rice.edu/duker/weamakecld.html	**Chapter 23**	**SC.912.E.7.1** Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon. **SC.912.E.7.4** Summarize the

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• **Humidity** • **Cloud Formation**	**SC.A.1.4.4** The student experiments and determines that the rates of reaction among atoms and molecules depend on the concentration, pressure, and temperature of the reactants and the presence or absence of catalysts. **AA** **SC.B.1.4.2** The student understands that there is conservation of mass and energy when matter is transformed. **SC.D.1.4.1** The student knows how climatic patterns on Earth result from an interplay of many factors (Earth's topography, its rotation on its axis, solar radiation, the transfer of heat energy where the atmosphere	**heat of fusion** **heat of vaporization** humidity latent heat lifted condensation level **physical change** precipitation relative humidity stability **water cycle**	• explain the steps of cloud formation • identify and explain the phase changes of the water cycle **Teaching Strategies:** • perform provided laboratory activities • create a foldable booklet illustrating the different types of clouds • elicit prior knowledge by using a "Think/Pair-Share" technique • create a visual representation (e.g., chart paper, board) of the water cycle	**Water Cycle** *(GZ) **Relative Humidity** *(CD or TX page 596) **Relative Humidity** *(GZ) **Dew Point** *(CD or TX page 579) **How Big is a Raindrop?** *(CD **LC: Light and Water in the Atmosphere** *(TX page 576) **LC: Hail** *(TX page 599) **Annual Precipitation in US** *(TX page 598)		conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans. **SC.912.P.10.2** Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity. **SC.912.P.10.4** Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter. **SC.912.P.12.12** Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.

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	interfaces with lands and oceans, and wind and ocean currents). **AA** **CBC: III.2.C, III.1.E, III.4.C**					
Meteorology **Air Masses and Fronts**	**SC.B.1.4.3** The student knows that temperature is a measure of the average translational kinetic energy of motion of the molecules in an object. **SC.D.1.4.1** The student knows how climatic patterns on Earth result from an interplay of many factors (Earth's topography, its rotation on its axis, solar radiation, the transfer of heat energy where the atmosphere interfaces with lands and oceans, and wind and ocean	air mass climate Coriolis effect modification front jet stream **second Law of Thermodynamics** weather	**The student will be able to:** • differentiate between the types of fronts and their associated weather • explain how high and low air pressure systems circulate in both of the Earth's hemispheres • explain the flow of heat using the second law of thermodynamics • differentiate between weather and climate **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps) to emphasize topic • use knowledge of	**Wind Chill** *(TX page 612) **Gathering Weather Data** *(TX page 618) **Coastal Winds & Clouds** *(GZ) **Weather Map Interpretation** *(TX page 626) **Weather Related Disasters** *(TX page 628)	**Chapter 24** **Chapter 2** (brief introduction)	**SC.912.P.10.5** Relate temperature to the average molecular kinetic energy. **SC.912.E.7.4** Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans. **SC.912.E.7.5** Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions. **SC.912.E.7.6** Relate the formation of severe weather to the various physical factors.

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	currents). **AA** **SC.E.2.4.7** The student knows that mathematical models and computer simulations are used in studying evidence from many sources to form a scientific account of the universe. **SC.H.3.4.1** The student knows that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure. **SC.H.3.4.5** The student knows that the value of a technology may differ for different people and at different times. **CBC: III.2.C, III.1.E,**		fronts to interpret a weather map • utilize computer simulations to observe the flow of air masses and the movement of heat in the atmosphere			

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	III.3.F, III.7.F					
Meteorology **Storms (Types and Stages)** • **Thunder-storms** • **Tornadoes** • **Hurricanes**	**SC.D.1.4.1** The student knows how climatic patterns on Earth result from an interplay of many factors (Earth's topography, its rotation on its axis, solar radiation, the transfer of heat energy where the atmosphere interfaces with lands and oceans, and wind and ocean currents). **AA** **SC.G.2.4.2** The student knows that changes in a component of an ecosystem will have unpredictable effects on the entire system but that the components of the system tend to react in a way that will restore the ecosystem to its original condition. **AA**	air-mass thunderstorm downburst eye eyewall frontal thunderstorm sea-breeze thunderstorm storm surge supercell tornado tropical cyclone	**The student will be able to:** • explain the formation of storms (thunderstorms, tornadoes, hurricanes) • describe the effects of storms • compare and contrast the characteristics and properties of storms **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps, Venn diagram) to emphasize topic • elicit prior knowledge by using a KWL on storms • utilize real-time satellite images to observe weather patterns	**Hurricane Motion** *(GZ) **Real-Time Satellite Images** http://www.Ssec.wisc.edu/data/ **Real-Time Weather Data** http://www.Rap.ucar.edu/weather/ **Graphic Organizer** *(TX page 609)	**Chapter 24**	**SC.912.N.3.5** Describe the function of models in science, and identify the wide range of models used in science **SC.912.E.7.4** Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans. **SC.912.E.7.5** Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions. **SC.912.E.7.6** Relate the formation of severe weather to the various physical factors. **SC.912.P.10.4** Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in

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	SC.H.2.4.1 The student knows that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful, systemic study. **AA** **CBC: III.2.C, III.1.E, II.3.B, III.2.D, II.10.B**					temperature or states of matter. **SC.912.L.17.4** Describe changes in ecosystems resulting from seasonal variations, climate change and succession. **SC.912.L.17.8** Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.

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Second Nine Weeks

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Meteorology **Storm Tracking** **Latitude** **Longitude**	**SC.E.2.4.7** The student knows that mathematical models and computer simulations are used in studying evidence from many sources to form a scientific account of the universe. **SC.H.3.4.1** The student knows that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure. **SC.H.3.4.3** The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand	**equator** global positioning system (GPS) international date line latitude longitude prime meridian	**The student will be able to:** construct a hurricane preparation plan describe the effects of storms compare and contrast the characteristics and properties of storms utilize maps and globes to develop familiarization with the geography of the Earth (include topics such as latitude, longitude, Tropic of Cancer and Capricorn, the poles, equator, prime meridian, time zones, continents, and oceans) **Teaching Strategies:** Perform provided laboratory activities use CRISS strategies (e.g. two-column notes, concept maps) to emphasize topic elicit prior knowledge by using a KWL on hurricanes obtain hurricane tracking maps from the local grocery store and use with real-time	**Climate web site:** http://www.noaa.gov/ **Real-Time Hurricanes Data** http://www.cotf.edu/ete/modules/sevweath/swhurricaneinfo.html **Weather Related Disasters 1980 – 2003** *(TX page 628) **Latent Heat and Thunderstorms** *(CD)	**Chapter 24**	**SC.912.N.3.5** Describe the function of models in science, and identify the wide range of models used in science. **SC.912.N.4.1** Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. **SC.912.N.4.2** Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental. **SC.912.E.7.5** Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.

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	the possible causes and effects of events. **SC.H.3.4.5** The student knows that the value of a technology may differ for different people and at different times. **SC.H.3.4.6** The student knows that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account. **CBC: III.3.F, III.5.F**		websites and graphing data plot coordinates on a map.			**SC.912.E.7.6** Relate the formation of severe weather to the various physical factors. **SC.912.E.7.9** Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
<u>Meteorology</u> **Climate** **Environmental Issues Affecting**	**SC.B.1.4.5** The student knows that each source of energy presents advantages and disadvantages to its use in society (e.g.,	**acid** acid precipitation deforestation **fossil fuels** global warming greenhouse	**The student will be able to:** identify how humans impact climate differentiate between global warming and ozone depletion	**Acid Rain** *(RG) **Greenhouse Effect** *(GZ) **Ecological Footprint**	**Chapter 7** **Chapter 25** **Chapter 22**	**SC.912.N.1.3** Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the

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Climate **Human Impact on Climate** **Air Pollution** **Global Warming** **Ozone Depletion**	political and economic implications may determine a society's selection of renewable or nonrenewable energy sources). **SC.D.1.4.1** The student knows how climatic patterns on Earth result from an interplay of many factors (Earth's topography, its rotation on its axis, solar radiation, the transfer of heat energy where the atmosphere interfaces with lands and oceans, and wind and ocean currents). **AA** **SC.G.2.4.1** The student knows that layers of energy-rich organic materials have been gradually turned into great coal beds and oil pools	effect ozone **pH** **pollution** smog	compare and contrast the greenhouse effect with global warming **Teaching Strategies:** perform provided laboratory activities use CRISS strategies (e.g. two-column notes, concept maps, Venn diagram) to emphasize topic discuss and illustrate through activities how climatic patterns on Earth result from the interplay of many factors, including human activities demonstrate the greenhouse effect through the use of models create posters to promote environmental awareness debate the validity of global warming, including environmental and government perspectives explore the causes of acid rain, as well as technological advances and their value, as they relate to this issue assess school-wide environmental footprint and	http://www.earthday.net/footprint/index.asp **Air Pollution Watch** *(CD) **Ultraviolet Protection** *(CD) **Acid Rain in Soils** *(CD) **LC: Keeping Cool with Algae** *(TX page 655) **LC: Global Warming** *(CD) **LC: The Ozone Hole** *(TX page 556)	**Chapter 14**	active consideration of alternative scientific explanations to explain the data presented. **SC.912.N.1.5** Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome. **SC.912.N.1.6** Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied. **SC.912.N.1.7** Recognize the role of creativity in constructing scientific questions, methods and explanations. **SC.912.N.2.4** Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new

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	(fossil fuels) by the pressure of the overlying earth and that humans burn fossil fuels to release the stored energy as heat and carbon dioxide. **SC.G.2.4.2** The student knows that changes in a component of an ecosystem will have unpredictable effects on the entire system but that the components of the system tend to react in a way that will restore the ecosystem to its original condition. **AA** **SC.G.2.4.5** The student understands that the amount of life any environment can support is limited and that human activities can change the flow of energy		create a school modification plan			investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. **SC.912.N.2.5** Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations. **SC.912.N.3.5** Describe the function of models in science, and identify the wide range of models used in science. **SC.912.N.4.1** Explain how scientific

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	and reduce the fertility of the Earth. **SC.G.2.4.6** The student knows the ways in which humans today are placing their environmental support systems at risk (e.g., rapid human population growth, environmental degradation, and resource depletion). **SC.H.1.4.4** The student knows that scientists in any one research group tend to see things alike and that therefore scientific teams are expected to seek out the possible sources of bias in the design of their investigations and in their data analysis. **SC.H.1.4.7** The student understands					knowledge and reasoning provide an empirically-based perspective to inform society's decision making. **SC.912.N.4.2** Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental. **SC.912.E.6.6** Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies. **SC.912.E.7.3** Differentiate and describe the various interactions among Earth systems, including atmosphere, hydrosphere, cryosphere, geosphere, and biosphere. **SC.912.E.7.4** Summarize the conditions

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	the importance of a sense of responsibility, a commitment to peer review, truthful reporting of the methods and outcomes of investigations, and making the public aware of the findings. **SC.H.3.4.3** The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events. **SC.H.3.4.4** The student knows that funds for science research come from federal government agencies, industry, and private foundations and that					that contribute to the climate of a geographic area, including the relationships to lakes and oceans. **SC.912.E.7.5** Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions. **SC.912.E.7.7** Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change. **SC.912.E.7.9** Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water. **SC.912.P.10.4** Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in

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	this funding often influences the areas of discovery. **SC.H.3.4.6** The student knows that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account. **CBC: I.4.A, I.6.A, III.2.C, III.1.E, III.1.D, III.2.D, III.3.E, III.5.F, III.6.F, III.8.F**					temperature or states of matter. **SC.912.P.10.5** Relate temperature to the average molecular kinetic energy. **SC.912.L.17.4** Describe changes in ecosystems resulting from seasonal variations, climate change and succession. **SC.912.L.17.11** Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests. **SC.912.L.17.15** Discuss the effects of technology on environmental quality. **SC.912.L.17.16** Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and

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						surface and groundwater pollution. **SC.912.L.17.19** Describe how different natural resources are produced and how their rates of use and renewal limit availability. **SC.912.L.17.20** Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
Meteorology **Ocean Dynamics** **Currents** **Waves** **Tides**	**SC.D.1.4.1** The student knows how climatic patterns on Earth result from an interplay of many factors (Earth's topography, its rotation on its axis, solar radiation, the transfer of heat energy where the atmosphere interfaces with lands and oceans, and wind and ocean currents). **AA**	amplitude **crest** density current gravity longshore current **Moon** **Moon Phases** **Salinity** **ocean basin** surface current **thermocline** **trough** turbidity current **wavelength**	**The student will be able to:** compare and contrast the physical and chemical properties of ocean water identify the characteristics of waves and currents explain how tides are formed compare and contrast various ocean currents explain how different currents affect climate worldwide describe the physical properties of waves	**Water Density & Stability** *(AP page 16) **Ocean Water Density** *(TX page 514) **Blue-Green Ocean** *(CD) **Density Factors** *(CD) **Making Waves** *(AP page 19) **Tides**	**Chapter 15** **Chapter 14** **Chapter 16**	**SC.912.E.7.5** Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions. **SC.912.E.5.4** Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth. **SC.912.E.5.6** Develop logical connections

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	SC.E.1.4.1 The student understands the relationships between events on Earth and the movements of the Earth, its moon, the other planets, and the sun. **AA** **SC.H.1.4.3** The student understands that no matter how well one theory fits observations, a new theory might fit them as well or better, or might fit a wider range of observations, because in science, the testing, revising, and occasional discarding of theories, new and old, never ends and leads to an increasingly better understanding of how things work in the world, but not to absolute truth.		**Teaching Strategies:** perform provided laboratory activities use CRISS strategies (e.g. two-column notes, concept maps, Venn diagram) to emphasize topic test the conductivity, buoyancy, and density of ocean water versus freshwater simulate wave behavior and characteristics with Slinkies, ropes, or springs	*(GZ) **Tides of the Shoreline** *(CD) **Sonar** *(CD) **Wave Motion** *(TX page 540) **LC: Beachcomber Tales** *(CD)		through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other. **SC.912.E.7.1** Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon. **SC.912.P.8.7** Interpret formula representations of molecules and compounds in terms of composition and structure. ***(Focus on the water molecule)* **SC.912.P.10.20** Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.

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	CBC: I.3.A, II.1.A, III.2.C, III.1.E, III.5.C, III.1.F					
Meteorology **Interplay of Climatic Patterns** **El Nino**	**SC.D.1.4.1** The student knows how climatic patterns on Earth result from an interplay of many factors (Earth's topography, its rotation on its axis, solar radiation, the transfer of heat energy where the atmosphere interfaces with lands and oceans, and wind and ocean currents). **AA** **SC.H.1.4.3** The student understands that no matter how well one theory fits observations, a new theory might fit them as well or better, or might fit a wider range of observations, because in science, the testing, revising, and occasional	climate El Niño **specific heat** upwelling	**The student will be able to:** explain how different currents affect climate worldwide describe the physical properties of waves explain the world wide and local effects of El Niño **Teaching Strategies:** perform provided laboratory activities use CRISS strategies (e.g. two-column notes, concept maps, Venn diagram, KWL) to emphasize topic research climatic phenomena	**Ocean Currents and Water Temperature** *(CD) **Sea Surface Temperatures in August Maps in Action** *(TX page 516) **Roaming Rubber Duckies Maps in Action** *(TX page 542)	**Chapter 25**	**SC.912.N.2.4** Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. **SC.912.N.3.1** Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. **SC.912.E.7.4** Summarize the conditions that contribute to the climate

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	discarding of theories, new and old, never ends and leads to an increasingly better understanding of how things work in the world, but not to absolute truth. **CBC: I.3.A, II.1.A, III.2.C, III.1.E, III.5.C, III.1.F**					of a geographic area, including the relationships to lakes and oceans.
Human Effect on Aquatic Environments	**SC.G.2.4.2** The student knows that changes in a component of an ecosystem will have unpredictable effects on the entire system but that the components of the system tend to react in a way that will restore the ecosystem to its original condition. **AA** **SC.G.2.4.5** The student understands that the amount of life any environment	aquifer nonpoint source point source	**The student will be able to:** list human activities that contribute to water pollution describe the major problems that threaten groundwater supplies discuss the impact of water pollution identify the causes and impact of water shortages illustrate and describe the path taken by water as it travels along Earth's surface and makes its way to streams, lakes, rivers, and oceans investigate factors that affect water quality; including pollution, overuse,	**Water Pollution** *(GZ) **Ecological Footprint** http://www.earthday.net/footprint/index.asp **Water Clarity** *(CD) **Oil Spills** *(CD) **LC: The Romance of Aquaculture** *(CD) **LC: A Harbor Makes a Comeback** *(TX page 517)	**Chapter 20**	**SC.912.N.1.3** Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented. **SC.912.N.2.5** Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural

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	can support is limited and that human activities can change the flow of energy and reduce the fertility of the Earth. **SC.G.2.4.6** The student knows the ways in which humans today are placing their environmental support systems at risk(e.g., rapid human population growth, environmental degradation, and resource depletion). **SC.H.1.4.4** The student knows that scientists in any one research group tend to see things alike and that therefore scientific teams are expected to seek out the possible sources of bias in the design of their investigations and in their data		and mechanical diversions, such as canals and levies (factors should be related to the quality of life on Earth) describe how water quality is maintained **Teaching Strategies:** perform provided laboratory activities use CRISS strategies (e.g. two-column notes, concept maps, Venn diagram) to emphasize topic debate controversial topics such as offshore drilling, water pollution, eutrophication, boating perform a water quality test create and implement a personal water conservation plan assess school-wide environmental footprint and create a school modification plan			phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations. **SC.912.N.4.1** Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. **SC.912.N.4.2** Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental. **SC.912.L.17.4** Describe changes in ecosystems resulting from seasonal variations, climate change and succession.

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	analysis. **SC.H.1.4.7** The student understands the importance of a sense of responsibility, a commitment to peer review, truthful reporting of the methods and outcomes of investigations, and making the public aware of the findings. **SC.H.3.4.3** The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events. **SC.H.3.4.4** The student knows that funds for science research come from					**SC.912.L.17.8** Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species. **SC.912.L.17.15** Discuss the effects of technology on environmental quality. **SC.912.L.17.16** Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution. **SC.912.L.17.20** Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

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	federal government agencies, industry, and private foundations and that this funding often influences the areas of discovery. **SC.H.3.4.6** The student knows that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account. **CBC: I.4.A, I.6.A, III.2.D, III.3.E, III.5.F, III.7.F, III.8.F**					
<u>Earth as a System</u> **Earth's Cycles** **Oxygen** **Carbon-Dioxide** **Nitrogen** **Phosphorus**	**SC.A.1.4.3** Knows that a change from one phase of matter to another involves a gain of loss of energy. **SC.B.1.4.1** Understands how knowledge of energy	air pollution atmosphere biosphere geosphere hydrosphere pollutant reservoir **system**	**The student will be able to:** describe the size and shape of Earth recognize the "spheres" that comprise the Earth system recognize internal and external sources of energy compare an open system	Effects of Solar Energy *(TX page 35)	**Chapter 2**	**SC.912.E.7.1** Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon. **SC.912.P.10.2** Explore the Law of Conservation of Energy by

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	is fundamental to all the scientific disciplines (e.g., the energy required for biological processes in living organisms and the energy required for the building, erosion, and rebuilding of the Earth). **SC.B.1.4.2** Understands that there is conservation of mass and energy when matter is transformed. **SC.B.1.4.6** Knows that the first Law of Thermodynamics relates the transfer of energy to the work done and the heat transferred. **SC.B.1.4.7** Knows that the total amount of usable energy always decreases, even though the total amount of energy is		with a closed system identify the two main sources of energy in the Earth system identify four processes in which matter and energy cycle on Earth **Teaching Strategies** use CRISS strategies (e.g. two-column notes, concept maps, Venn diagram) to emphasize topic demonstrate open and closed systems (TE TX 31)			differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity. **SC.912.L.17.7** Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems. **SC.912.L.17.9** Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels. **SC.912.L.17.10** Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.

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	conserved in any transfer. **SC.D.2.4.1** Understands the interconnectedness of the systems on Earth and the quality of life. **SC.G.1.4.1** Knows of the great diversity and interdependence of living things flow of energy through ecosystems. **AA** **SC.G.1.4.2** Understands how the flow of energy through an ecosystem made up of producers, consumers, and decomposers carries out the processes of life and that some energy dissipates as heat and is not recycled. **SC.G.1.4.3** The					

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	student knows that the chemical elements that make up the molecules of living things are combined and recombined in different ways. **SC.G.2.4.2** The student knows that changes in a component of an ecosystem will have unpredictable effects on the entire system but that the components of the system tend to react in a way that will restore the ecosystem to its original condition. **AA** **CBC: III.4.C, III.2.D**					
Geology **Structure and Layers of the Earth**	**SC.D.1.4.2** The student knows that the solid crust of Earth consists of slow-moving, separate plates that	asthenosphere core **crust** inner core lithosphere **magnetic field**	**The student will be able to:** identify and describe the four major layers of the Earth explain the relationship	**What's Under Our Feet?** *(AP page 31) **Earth's Layers** http://www.knowledge.	**Chapter 1** **Chapter 10**	**SC.912.N.3.5** Describe the function of models in science, and identify the wide range of models used in science.

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	float on a denser, molten layer of Earth and that these plates interact with each other, changing the Earth's surface in many ways (e.g., forming mountain ranges and rift valleys, causing earthquake and volcanic activity, and forming undersea mountains that can become ocean islands). **AA** **SC.D.1.4.4** The student knows that Earth's systems and organisms are the result of a long, continuous change over time **SC.E.2.4.7** The student knows that mathematical models and computer simulations are used in studying evidence from many sources to form a scientific	mantle outer core	between the Earth's layers and their role in plate tectonics **Teaching Strategies:** perform provided laboratory activities use CRISS strategies (e.g. two-column notes, concept maps) to emphasize topic using an apple or orange, illustrate the layers of the Earth to give an overview of the planet's inner structure	state.va.us/cgi-bin/lesview.cgi?idl=14		**SC.912.E.6.2** Connect surface features to surface processes that are responsible for their formation. **SC.912.E.6.3** Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates. **SC.912.E.6.5** Describe the geologic development of the present day oceans and identify commonly found features.

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	account of the universe. **SC.H.3.4.1** The student knows that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure. **CBC: III.1.B, III.3.F, III.2.B**					
Geology **Minerals, Crystals and Rocks** **Mineral Types** **Rock Types** **Rock Cycle**	**SC.B.1.4.1** The student understands how knowledge of energy is fundamental to all the scientific disciplines (e.g., the energy required for biological processes in living organisms and the energy required for the building, erosion, and rebuilding of the Earth). **AA**	clastic sedimentary rock contact metamorphism **deposition** extrusive **igneous rocks** intrusive lithification **metamorphic rocks** mineral porosity rock cycle sediment	**The student will be able to:** investigate the physical and chemical properties of minerals compare and contrast rocks and minerals identify the three basic types of rocks based on physical and chemical characteristics explain the rock cycle **Teaching Strategies:** perform provided laboratory activities	**Mineral Identification** http://www.womeninmining.org/pdfs/ActMinID.pdf **Is It A Mineral?** *(AP page 42) **Sort the Minerals** *(AP page 43) **Mystery Rock Lab Activity** *(AP page 45) **Mineral and Rock**	**Chapter 5** **Chapter 6**	**SC.912.N.1.1** Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: • pose questions about the natural world, • conduct systematic observations, • examine books and other sources of information to see what is already known, • review what is known in light of empirical evidence,

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High School Science: Curriculum Pacing Guide for Earth/Space Science

Topic	FSSS/CBC Alignment	Vocabulary (FCAT Terms in Bold)	Suggested Strategies for Lesson Development	Activities/Lab/ Resources	Textbook Alignment	Next Generation Sunshine State Standards
	SC.D.1.4.4 The student knows that Earth's systems and organisms are the result of a long, continuous change over time. **SC.H.2.4.1** The student knows that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful, systemic study. **AA** **CBC: II.10.B, III.3.A**	**sedimentary rocks**	use CRISS strategies (e.g. two-column notes, concept maps, Venn diagram) to emphasize topic introduce the students to the world of minerals by using the suggested resource "Is It A Mineral?" activate prior knowledge through discussion of everyday items that contain minerals provide an assortment of items of which some are minerals and some are not, for students to sort based on prior knowledge explore and diagram the rock cycle identify and sort rock types into sedimentary, metamorphic, and igneous categories based upon physical and/or chemical characteristics incorporate the "Mystery Rock Lab" that will require students to distinguish between rock types and minerals	**Match** http://www.womeninmining.org/pdfs/ActMinRockMat.pdf **The Rock Cycle** http://www.womeninmining.org/rockcyc.htm **Rock Cycle** *(GZ) **Rock Classification** *(GZ) **Rock Cycle Crayon Simulation** http://preuss.ucsd.edu/FacultyWebpages/Solomon/Science%20Pages/Assignments/04%20Rocks,%20Minerals/Rock%20Cycle%20Sim%20Lab(new).doc **Determining Density** *(TX page 113) **Copper Recovery** *(CD) **Crystal Formation** *(TX page 130)		• plan investigations, • use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), • pose answers, explanations, or descriptions of events, • generate explanations that explicate or describe natural phenomena (inferences), • use appropriate evidence and reasoning to justify these explanations to others, • communicate results of scientific investigations, and evaluate the merits of the explanations produced by others. **SC.912.N.1.2** Describe and explain what characterizes science and its methods. **SC.912.E.6.2** Connect surface features to surface processes that are

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				Mineral Identification *(CD or TX page 120) **Classification of Rocks** *(CD or TX page 150) **Rock and Mineral Production in the United States** *(TX page 122) **Sorting Sediments** *(CD) **Metamorphic Rock** *(CD) **LC: Mining Engineer** *(TX page 123)		responsible for their formation. **SC.912.E.6.3** Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.

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Curriculum and Instruction (Science)
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Third Nine Weeks

Topic	FSSS/CBC Alignment	Vocabulary (FCAT Terms in Bold)	Suggested Strategies for Lesson Development	Activities/Lab Resources	Textbook Alignment	New Generation Sunshine State Standards
Geology **Continental Drift** **Sea-Floor Spreading** **Plate Tectonics** • **Plate Boundaries** • **Features of the Seafloor**	**SC.B.1.4.1** The student understands how knowledge of energy is fundamental to all the scientific disciplines (e.g., the energy required for biological processes in living organisms and the energy required for the building, erosion, and rebuilding of the Earth). **AA** **SC.D.1.4.2** The student knows that the solid crust of Earth consists of slow-moving, separate plates that float on a denser, molten layer of Earth and that these plates interact with each other, changing the Earth's surface in many ways (e.g., forming mountain	continental drift **convection** **convergent boundary** divergent boundary magnetic reversal **mid-ocean ridge** paleomagnetism Pangaea **plate tectonics** ridge push **rift valley** seafloor spreading slab pull subduction **topography** transform boundary	**The student will be able to:** • describe early evidence that lead to the suggestion that Earth's continents may once have been joined • explain why continental drift was not accepted when it was first proposed • summarize the evidence that lead to the discovery of seafloor spreading • explain the significance of magnetic patterns on the seafloor • explain the process of seafloor spreading • explain the theory of plate tectonics • compare and contrast the three types of plate boundaries and the features associated with each one • explain the process of convection • summarize how	**Seafloor Spreading** *(AP page 37) **Musical Plates** *(RG) **Plate Tectonics** *(GZ) **Crustal Bending & Faulting** *(AP page 39) **Seafloor Spreading** *(CD or TX page 266) **Eggshell Tectonics** *(CD) **The Paleo Map Project** *(CD) **Tectonic Plate Boundaries** *(CD or TX page 253) Modeling **Isostacy** *(CD) **Modeling Stress & Strain** *(CD)	**Chapter 10**	**SC.912.N.1.2** Describe and explain what characterizes science and its methods. **SC.912.N.1.3** Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented. **SC.912.N.1.5** Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome. **SC.912.N.1.6** Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.

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Topic	FSSS/CBC Alignment	Vocabulary (FCAT Terms in Bold)	Suggested Strategies for Lesson Development	Activities/Lab Resources	Textbook Alignment	New Generation Sunshine State Standards
	ranges and rift valleys, causing earthquake and volcanic activity, and forming undersea mountains that can become ocean islands). **AA** **SC.D.1.4.3** The student knows that changes in Earth's climate, geological activity, and life forms may be traced and compared. **SC.D.1.4.4** The student knows that Earth's systems and organisms are the result of a long, continuous change over time. **SC.E.2.4.7** The student knows that mathematical models and computer simulations are used in studying evidence from many sources to form a scientific		convection in the mantle is related to the movement of tectonic plates • compare and contrast the processes of ridge push and slab pull **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps, Venn-diagram) to emphasize topic • activities that use a puzzle in which students construct a hypothetical model of Pangaea and explore the role that continental drift has played in the current positioning of the continents • through activity and discussion, students will explore the evidence for continental drift and the theory of plate tectonics • construct a model of the seafloor and learn how and why spreading occurs • demonstrate plate	**Continental Collisions** *(CD) **Locations of earthquakes in South America** *(TX page 268) **LC: The Mid-Atlantic Ridge** *(TX page 269) **Chain of Events** *(TX page 243)		**SC.912.N.1.7** Recognize the role of creativity in constructing scientific questions, methods and explanations. **SC.912.N.2.4** Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. **SC.912.N.2.5** Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that

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	account of the universe. **SC.F.2.4.3** The student understands the mechanisms of change (e.g., mutation and natural selection) that lead to adaptations in a species and their ability to survive naturally in changing conditions and to increase species diversity. **AA** **SC.H.1.4.1** The student knows that investigations are conducted to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories. **AA** **SC.H.1.4.2** The student knows that from time to time, major shifts occur in		boundaries • demonstrate convection			have the potential to add new evidence to support one or another of the explanations. **SC.912.N.3.1** Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. **SC.912.N.3.2** Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science. **SC.912.E.6.2** Connect surface features to surface processes that are responsible for their formation. **SC.912.E.6.3** Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of

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	the scientific view of how the world works, but that more often the changes that take place in the body of scientific knowledge are small modifications of prior knowledge. **SC.H.1.4.3** The student understands that no matter how well one theory fits observations, a new theory might fit them as well or better, or might fit a wider range of observations, because in science, the testing, revising, and occasional discarding of theories, new and old, never ends and leads to an increasingly better understanding of how things work in the world, but not to absolute truth.					moving plates. **SC.912.E.6.5** Describe the geologic development of the present day oceans and identify commonly found features.

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	SC.H.1.4.5 The student understands that new ideas in science are limited by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring from unexpected findings, and usually grow slowly from many contributors. **SC.H.1.4.6** The student understands that, in the short run, new ideas that do not mesh well with mainstream ideas in science often encounter vigorous criticism and that, in the long run, theories are judged by how they fit with other theories, the range of observations they explain, how well they explain observations, and					

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	how effective they are in predicting new findings. **SC.H.2.4.1** The student knows that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful, systemic study. **AA** **SC.H.3.4.1** The student knows that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure. **SC.H.3.4.5** The student knows that					

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	the value of a technology may differ for different people and at different times. **CBC: III.1.C, III.4.A, III.3.C, III.2.E, III.1.B, I.1.A, I.2.A, I.3.A, I.5.A, I.6.A, II.10.B, III.3.F, III.7.F**					
Geology **Plate Tectonics (continued)** • **Earthquakes**	**SC.D.1.4.2** The student knows that the solid crust of Earth consists of slow-moving, separate plates that float on a denser, molten layer of Earth and that these plates interact with each other, changing the Earth's surface in many ways (e.g., forming mountain ranges and rift valleys, causing earthquake and volcanic activity, and forming undersea mountains that can become ocean	**earthquake** epicenter fault focus magnitude primary wave Richter scale secondary wave seismometer strain stress surface wave tephra tsunami **vibration** wave	**The student will be able to:** • define stress and strain as they apply to rocks • distinguish among the three types of faults • contrast three types of seismic waves • explain how seismic waves have been used to determine the structure and composition of Earth's interior • compare and contrast earthquake magnitude and intensity and the scales used to measure each • explain why data from at least 3 seismic stations are needed to locate an earthquake's epicenter	**Earthquake Recording Station** *(GZ) **Earthquake/Determination of an Epicenter** *(GZ) **Building an Earthquake Proof Home** www.vanderbilt.edu/cso/SSI2003-Williamson/lessons/homes.doc **Seismograph Record** *(TX page 302) **Tsunami** *(CD)	**Chapter 10** **Chapter 12**	**SC.912.N.1.2** Describe and explain what characterizes science and its methods. **SC.912.N.3.5** Describe the function of models in science, and identify the wide range of models used in science. **SC.912.N.4.1** Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. **SC.912.N.4.2** Weigh the merits of alternative strategies for solving a specific societal problem by

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	islands). **AA** **SC.E.2.4.7** The student knows that mathematical models and computer simulations are used in studying evidence from many sources to form a scientific account of the universe. **SC.H.2.4.2** The student knows that scientists control conditions in order to obtain evidence, but when that is not possible for practical or ethical reasons, they try to observe a wide range of natural occurrences to discern patterns. **SC.H.3.4.1** The student knows that performance testing is often conducted using small-scale models, computer simulations, or		**Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps, Venn diagram) to emphasize topic • using a combination of real data and research, the student groups will study the formation of earthquakes, volcanoes, and mountains • conduct group research on various types of boundary interactions (CRISS - jigsaw strategy) • activate students prior knowledge on earthquakes	**Earthquake Safe Buildings** *(TX page 306) **Where Do Earthquakes Happen?** *(CD) **Finding an Epicenter** *(TX page 314) **Locations of Earthquakes in South America 2002 - 2003** *(TX page 268) **Earthquake Hazard Map Maps in Action** *(TX page 316) **Simulating Earthquakes** *(CD) **Earthquakes and Soil** *(CD) **LC: Seismic Reflection Survey** *(TX page 297) **LC: Hazards in the Americas** *(TX page 316 Teachers Edition)		comparing a number of different costs and benefits, such as human, economic, and environmental. **SC.912.E.6.2** Connect surface features to surface processes that are responsible for their formation. **SC.912.E.6.3** Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.

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	analogous systems to reduce the chance of system failure. **SC.H.3.4.3** The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events. **SC.H.3.4.5** The student knows that the value of a technology may differ for different people and at different times. **SC.H.3.4.6** The student knows that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and			**LC: Geophysicist** *(TX page 317)		

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	limitations into account. **CBC: III.1.B, II.2.B, I.7.A, III.3.F, III.6.F, III.7.F, III.8.F**					
Geology **Plate Tectonics (continued)** • **Volcanoes**	**SC.D.1.4.2** The student knows that the solid crust of Earth consists of slow-moving, separate plates that float on a denser, molten layer of Earth and that these plates interact with each other, changing the Earth's surface in many ways (e.g., forming mountain ranges and rift valleys, causing earthquake and volcanic activity, and forming undersea mountains that can become ocean islands). **AA** **SC.E.2.4.7** The student knows that mathematical models	caldera cinder cone volcano composite volcano crater hot spot pyroclastic flow shield volcano tephra vent **vibration** viscosity **volcano**	**The student will be able to:** • compare and contrast the different kinds of magma • compare and contrast shield cone, cinder cone, and composite volcanoes • contrast the volcanism that occurs at plate boundaries • explain the relationship between volcanism and hot spots **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps, Venn diagram) to emphasize topic • using a combination of real data and research, the student groups will study	**Changing Melting Point** *(CD or TX page 320) **Magma in Earth's Crust** *(CD) **Volcano Verdict** *(CD or TX page 336) **Volcanic Cones** *(CD or TX page 328) **The Hawaiian-Emperor Seamount Chain** *(TX page 338) **Lava Flows** *(CD) **Suggested Videos:** • Dante's Peak, • Mt. St Helen's (PBS) **LC: The Effects of Volcanoes on**	**Chapter 10** **Chapter 13** **Chapter 28** (only the Extra-terrestrial Volcanism reading activity on page 724)	**SC.912.N.1.2** Describe and explain what characterizes science and its methods. **SC.912.N.3.5** Describe the function of models in science, and identify the wide range of models used in science. **SC.912.N.4.1** Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. **SC.912.N.4.2** Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.

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	and computer simulations are used in studying evidence from many sources to form a scientific account of the universe. **SC.H.2.4.2** The student knows that scientists control conditions in order to obtain evidence, but when that is not possible for practical or ethical reasons, they try to observe a wide range of natural occurrences to discern patterns. **SC.H.3.4.1** The student knows that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure.		the formation of earthquakes, volcanoes, and mountains • incorporate videos that will allow students to compare and contrast real versus staged volcanoes • conduct group research on various types of boundary interactions (CRISS - jigsaw strategy)	**Climate** *(TX page 339) **LC: Extraterrestrial Volcanism** *(TX page 734)		**SC.912.E.6.2** Connect surface features to surface processes that are responsible for their formation. **SC.912.E.6.3** Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.

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	SC.H.3.4.3 The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events. **SC.H.3.4.5** The student knows that the value of a technology may differ for different people and at different times. **SC.H.3.4.6** The student knows that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account. **CBC: III.1.B, II.2.B,**					

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	I.7.A, III.3.F, III.6.F, III.7.F, III.8.F					
Geology **Weathering & Erosion** • **Mechanical Weathering** • **Chemical Weathering**	**SC.B.1.4.1** The student understands how knowledge of energy is fundamental to all the scientific disciplines (e.g., the energy required for biological processes in living organisms and the energy required for the building, erosion, and rebuilding of the Earth). **AA** **SC.D.1.4.4** The student knows that Earth's systems and organisms are the result of a long, continuous change over time. **SC.G.2.4.4** The student knows that the world ecosystems are shaped by physical factors that limit their	abrasion chemical change **chemical weathering** continental glacier deposition **erosion** esker exfoliation frost wedging glacier gully erosion hydrolysis mechanical weathering moraine outwash plain oxidation physical change rill erosion transported soil valley glacier **weathering**	**The student will be able to:** • distinguish between weathering and erosion • identify variables that affect the rate of weathering • compare and contrast mechanical and chemical weathering • experimentally examine the effects of weathering on different types of rocks • relate the basic soil types to productivity and explore the relationship between fertility and erosion • describe the role energy (i.e., wind, heat) plays during the processes of building, erosion, and rebuilding the Earth • describe how glaciers modify the landscape **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies	**Mechanical Weathering** *(CD or TX page 345) **Surface Areas** *(CD or TX page 350) **Soil Chemistry** *(TX page 370) **Soil Map of North Carolina** *(TX page 372) **LC: Land Degradation** *(TX page 359) **LC: Soil Conservationist** *(TX page 373)	**Chapter 14**	**SC.912.E.6.2** Connect surface features to surface processes that are responsible for their formation. **SC.912.E.6.4** Analyze how specific geologic processes and features are expressed in Florida and elsewhere. **SC.912.E.7.1** Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon. **SC.912.E.7.3** Differentiate and describe the various interactions among Earth systems, including atmosphere, hydrosphere, cryosphere, geosphere, and biosphere. **SC.912.P.12.12** Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical

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Topic	FSSS/CBC Alignment	Vocabulary (FCAT Terms in Bold)	Suggested Strategies for Lesson Development	Activities/Lab Resources	Textbook Alignment	New Generation Sunshine State Standards
	productivity. **SC.H.2.4.1** The student knows that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful, systemic study. **AA** **CBC: III.1.C, II.10.B, III.2.F**		(e.g. two-column notes, concept maps, Venn diagram) to emphasize topic • create a foldable booklet on the different types of erosion • demonstrate the process of weathering • have students bring in samples of rocks and discuss patterns of weathering • explore school campus to observe examples of weathering caused by tree roots, water, etc.			reaction.
Natural History **Radiometric Dating**	**SC.A.2.4.3** The student knows that a number of elements have heavier, unstable nuclei that decay, spontaneously giving off smaller particles and waves that result in a small loss of mass and release a	correlation cross-cutting relationship deposition **fossil** **half-life** **isotope** original horizontality radioactive decay	**The student will be able to:** • apply the principles for determining relative age to interpret rock sequences • explain the different methods used by scientists to determine absolute age • describe how objects are dated by the use of selected radioactive	**The Case of the Melting Ice** http://www.sciencenetlinks.com/lessons_printable.cfm?DocID=171 **What's Your Relative Age** *(CD or TX page 186) **Determining the**	**Chapter 8**	**SC.912.N.1.2** Describe and explain what characterizes science and its methods. **SC.912.N.1.4** Identify sources of information and assess their reliability according to the strict standards of scientific investigation.

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Curriculum and Instruction (Science)
High School Science: Curriculum Pacing Guide for Earth/Space Science

Topic	FSSS/CBC Alignment	Vocabulary (FCAT Terms in Bold)	Suggested Strategies for Lesson Development	Activities/Lab Resources	Textbook Alignment	New Generation Sunshine State Standards
	large amount of energy. **SC.D.1.4.3** The student knows that changes in Earth's climate, geological activity, and life forms may be traced and compared. **SC.D.1.4.4** The student knows that Earth's systems and organisms are the result of a long, continuous change over time. **SC.G.2.4.1** The student knows that layers of energy-rich organic materials have been gradually turned into great coal beds and oil pools (fossil fuels) by the pressure of the overlying earth and that humans burn fossil fuels to release the stored energy as heat and carbon	radiometric dating superposition unconformity uniformitarianism	elements • define fossil • discuss how fossil evidence supports the theory of continuous change over time • apply evidences of change to construct Earth's changes over time **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps) to emphasize topic • have students create a personal relative time scale and then convert it into an absolute time scale • illustrate how radioactive carbon dating (isotope) is used to determine a fossil's age • demonstrate the process of half-life • have students watch film	**Relative Age of Rock Strata** *(CD) **Types of Fossils** *(TX page 206) **Radioactive Decay** *(TX page 194) **History in the Rocks** *(TX page 232) **LC: Radioactive Decay of Uranium** *(TX page 193) **Geologic Map of Bedrock in Ohio** *(TX page 208) **LC: Clues to Climate Change** *(TX page 208)		**SC.912.N.1.5** Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome. **SC.912.N.1.6** Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied. **SC.912.N.1.7** Recognize the role of creativity in constructing scientific questions, methods and explanations. **SC.912.N.2.4** Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.

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	dioxide. **AA** **SC.H.1.4.1** The student knows that investigations are conducted to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories. **AA** **SC.H.2.4.1** The student knows that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful, systemic study. **AA** **CBC: III.4.A, III.3.C, III.2.E, I.1.A, III.1.D, II.10.B**					**SC.912.P.10.11** Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues. .

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Topic	FSSS/CBC Alignment	Vocabulary (FCAT Terms in Bold)	Suggested Strategies for Lesson Development	Activities/Lab Resources	Textbook Alignment	New Generation Sunshine State Standards
Natural History **Earth's History** **Geologic Time Scale** **Changes Over Time**	**SC.D.1.4.3** The student knows that changes in Earth's climate, geological activity, and life forms may be traced and compared. **SC.D.1.4.4** The student knows that Earth's systems and organisms are the result of a long, continuous change over time. **SC.G.2.4.1** The student knows that layers of energy-rich organic materials have been gradually turned into great coal beds and oil pools (fossil fuels) by the pressure of the overlying earth and that humans burn fossil fuels to release the stored energy as heat and carbon dioxide. **AA**	adaptation Cenozoic epoch era evolution **fossil** geologic time Mesozoic Paleozoic scale	**The student will be able to:** • define fossil • discuss how fossil evidence supports the theory of continuous change over time • describe the geologic time scale **Teaching Strategies:** • use CRISS strategies (e.g. two-column notes, concept maps) to emphasize topic • have students create a personal relative time scale and then convert it into an absolute time scale	**Constructing a Timeline*(IP)** http://village.dadeschools.net/ **Geologic Time Scale** *(CD or TX page 212) **Stratigraphic Columns** *(AP page 34) **Geologic Map of Bedrock in Ohio** *(TX page 208) **LC: Natural Selection** *(TX page 216) **Chocolate Candy Survival** *(TX page 217) **History in the Rocks** *(TX page 232) **Fossil Evidence for Gondwanaland** *(TX page 234) **LC: CT Scanning**	**Chapter 9**	**SC.912.N.1.2** Describe and explain what characterizes science and its methods. **SC.912.N.1.4** Identify sources of information and assess their reliability according to the strict standards of scientific investigation. **SC.912.N.1.5** Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome. **SC.912.N.1.6** Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied. **SC.912.N.1.7** Recognize the role of creativity in constructing scientific questions, methods and explanations. **SC.912.N.2.4** Explain that scientific knowledge is both

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Topic	FSSS/CBC Alignment	Vocabulary (FCAT Terms in Bold)	Suggested Strategies for Lesson Development	Activities/Lab Resources	Textbook Alignment	New Generation Sunshine State Standards
	SC.H.1.4.1 The student knows that investigations are conducted to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories. **AA** **SC.H.2.4.1** The student knows that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful, systemic study. **AA** **CBC: III.4.A, III.3.C, III.2.E, I.1.A, III.1.D, II.10.B**			**Fossils** *(TX page 235)		durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. **SC.912.P.10.11** Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues. **SC.912.L.15.1** Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change. **SC.912.L.15.2** Discuss the use of molecular clocks to estimate how long ago

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Topic	FSSS/CBC Alignment	Vocabulary (FCAT Terms in Bold)	Suggested Strategies for Lesson Development	Activities/Lab Resources	Textbook Alignment	New Generation Sunshine State Standards
						various groups of organisms diverged evolutionarily from one another. **SC.912.L.15.3** Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction. **SC.912.L.15.4** Describe how and why organisms are hierarchically classified and based on evolutionary relationships. **SC.912.L.15.8** Describe the scientific explanations of the origin of life on Earth.

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Fourth Nine Weeks

Topic	FSSS/CBC Alignment	Vocabulary (FCAT Terms in Bold)	Suggested Strategies for Lesson Development	Activities/Lab Resources	Textbook Alignment	New Generation Sunshine State Standards
Astronomy **History of Astronomy** **Physics in Astronomy** • **Gravity** • **Force** • **Newton's Laws** • **Law of Universal Gravitation**	**SC.B.2.4.1** The student knows that the structure of the universe is the result of interactions involving fundamental particles (matter) and basic forces (energy) and that evidence suggests that the universe contains all of the matter and energy that ever existed. **SC.C.1.4.1** The student knows that all motion is relative to whatever frame of reference is chosen and that there is no absolute frame of reference from which to observe all motion **SC.C.1.4.2** The student knows that any change in velocity is an	**acceleration** action **centrifugal force** **centripetal force** **gravity** **gravitation** **inertia** reaction **speed** **velocity**	**The student will be able to:** • identify Newton's laws • calculate force given mass and acceleration • calculate the force objects apply to the surface of Earth and the other eight planets • describe changes in the scientific perception of the universe over time • explain the contributions of scientists in the advancement of astronomy over time **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps, Venn diagram, KWL) to emphasize topic • create a water bottle rocket (SECME activity) to reinforce	NASA Website **www.nasa.gov** **Light at a Distance** *(RG) **Gravitational Force** *(GZ) **Ellipses** *(TX page 692)	**Chapter 26** (brief intro to astronomy) **Chapter 27, section 2**	**SC.912.N.1.2** Describe and explain what characterizes science and its methods. **SC.912.N.2.4** Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. **SC.912.N.2.5** Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source

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	acceleration. **SC.C.2.4.1** The student knows that acceleration due to gravitational force is proportional to mass and inversely proportional to the square of the distance between the objects. **AA** **SC.C.2.4.6** The student explains that all forces come in pairs commonly called action and reaction. **SC.H.1.4.2** The student knows that from time to time, major shifts occur in the scientific view of how the world works, but that more often the changes that take place in the body of scientific knowledge are small modifications of prior knowledge.		Newton's laws • demonstrate how an object stays in a circular orbit through the combined effect of centrifugal and centripetal forces • construct a timeline of now astronomy has changed with the advent of technology			of new, testable ideas that have the potential to add new evidence to support one or another of the explanations. **SC.912.N.3.1** Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. **SC.912.N.3.2** Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science. **SC.912.N.3.3** Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships. **SC.912.N.3.5** Describe the function of models in

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	SC.H.1.4.3 The student understands that no matter how well one theory fits observations, a new theory might fit them as well or better, or might fit a wider range of observations, because in science, the testing, revising, and occasional discarding of theories, new and old, never ends and leads to an increasingly better understanding of how things work in the world, but not to absolute truth. **SC.H.1.4.5** The student understands that new ideas in science are limited by the context in which they are conceived, are often rejected by the scientific					science, and identify the wide range of models used in science. **SC.912.E.5.1** Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe. **SC.912.E.5.2** Identify patterns in the organization and distribution of matter in the universe and the forces that determine them. **SC.912.E.5.6** Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other. **SC.912.P.12.2** Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.

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	establishment, sometimes spring from unexpected findings, and usually grow slowly from many contributors. CS **SC.H.1.4.6** The student understands that, in the short run, new ideas that do not mesh well with mainstream ideas in science often encounter vigorous criticism and that, in the long run, theories are judged by how they fit with other theories, the range of observations they explain, how well they explain observations, and how effective they are in predicting new findings. **SC.H.2.4.1** The student knows that scientists assume that the universe is a					**SC.912.P.12.3** Interpret and apply Newton's three laws of motion. **SC.912.P.12.4** Describe how the gravitational force between two objects depends on their masses and the distance between them.

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	vast system in which basic rules exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful, systemic study. **AA** **SC.H.3.4.1** The student knows that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure. CS **SC.H.3.4.2** The student knows that technological problems often create a demand for new scientific knowledge and that new technologies make it possible for scientists to extend					

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	their research in a way that advances science. **AA** **SC.H.3.4.5** The student knows that the value of a technology may differ for different people and at different times. **CBC: II.1.B, II.2.B, II.10.B**					
Astronomy **Instruments of Astronomy** **Astronomical Data Gathering** **The Big Bang Theory**	**SC.A.2.4.4** The student knows that nuclear energy is released when small, light atoms are fused into heavier ones. **SC.B.2.4.1** The student knows that the structure of the universe is the result of interactions involving fundamental particles (matter) and basic forces (energy) and that evidence suggests that the universe contains all	background Big Bang Theory cosmic cosmology Hubble constant inflationary **prism** radiation **refraction** **spectroscope**	**The student will be able to:** • describe and cite evidence of the Big Bang Theory and evidence of expansion of the universe • list various astronomical data gathering instruments **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps) to emphasize topic • use online resources such as NASA to	**NASA website** www.nasa.gov **LC: Light Pollution *(TX page 664)** **Modeling a Pendulum *(TX page 668)** **Light Sources *(TX page 682)** **LC: Landsat Maps of Earth** *(TX 683) **Galileo Probes Jupiter**	**Chapter 26** **Chapter 27** **Chapter 30 section 4**	**SC.912.N.1.2** Describe and explain what characterizes science and its methods. **SC.912.N.2.3** Identify examples of pseudoscience (such as astrology, phrenology) in society. **SC.912.N.2.4** Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations,

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	of the matter and energy that ever existed. **SC.C.1.4.1** The student knows that all motion is relative to whatever frame of reference is chosen and that there is no absolute frame of reference from which to observe all motion. **SC.C.2.4.1** The student knows that acceleration due to gravitational force is proportional to mass and inversely proportional to the square of the distance between the objects. **AA** **SC.E.2.4.5** The student knows various scientific theories on how the universe was formed. **SC.E.2.4.6** The		research the various instruments used to collect and generate data on the universe	*(TX page 703) **LC: Astronomer** *(TX page 717) **LC: Studying Stars in Formation** *(TX page 805) **The Expanding Universe** *(TX page 795)		scientific knowledge becomes stronger, leading to its durability. **SC.912.N.3.1** Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. **SC.912.N.3.2** Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science. **SC.912.E.5.1** Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe. **SC.912.E.5.2** Identify patterns in the organization and distribution of matter in the universe and the forces

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	student knows the various ways in which scientists collect and generate data about our universe (e.g., X-ray telescopes, computer simulations of gravitational systems, nuclear reactions, space probes, and supercollider simulations). **SC.E.2.4.7** The student knows that mathematical models and computer simulations are used in studying evidence from many sources to form a scientific account of the universe. **SC.H.1.4.1** The student knows that investigations are conducted to explore new phenomena, to check on previous results, to test how					that determine them. **SC.912.E.5.8** Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools. **SC.912.E.5.11** Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations. **SC.912.P.12.4** Describe how the gravitational force between two objects depends on their masses and the distance between them. **SC.912.P.10.10** Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear). **SC.912.P.10.21** Qualitatively describe the shift in frequency in sound or electromagnetic waves due

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	well a theory predicts, and to compare different theories. **AA** **SC.H.1.4.3** The student understands that no matter how well one theory fits observations, a new theory might fit them as well or better, or might fit a wider range of observations, because in science, the testing, revising, and occasional discarding of theories, new and old, never ends and leads to an increasingly better understanding of how things work in the world, but not to absolute truth**.** **SC.H.2.4.1** The student knows that scientists assume that the universe is a vast system in which					to the relative motion of a source or a receiver.

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	basic rules exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful, systemic study. **AA** **SC.H.3.4.2** The student knows that technological problems often create a demand for new scientific knowledge and that new technologies make it possible for scientists to extend their research in a way that advances science. **AA** **SC.H.3.4.4** The student knows that funds for science research come from federal government agencies, industry, and private foundations and that					

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	this funding often influences the areas of discovery. **SC.H.3.4.5** The student knows that the value of a technology may differ for different people and at different times. **CBC: II.1.B, II.2.B, II.9.B, I.1.A, I.3.A, II.10.B, III.4.F, III.6.F, III.7.F, II.8.B, II.9.B**					
Astronomy **The Sun, Earth, and Moon as a System** • **The Moon** • **Eclipses** • **Seasons**	**SC.D.1.4.1** The student knows how climatic patterns on Earth result from an interplay of many factors (Earth's topography, its rotation on its axis, solar radiation, the transfer of heat energy where the atmosphere interfaces with lands and oceans, and wind and ocean currents). **AA**	apogee autumnal equinox **axis** ecliptic lunar eclipse **Moon** Moon phases perigee solar eclipse summer solstice synchronous rotation winter solstice vernal equinox	**The student will be able to:** • identify features on the Moon • explain the theories about the formation of the Moon • identify the relative positions and motions of Earth, the Sun, and the Moon • describe the phases of the Moon • explain the eclipses of the Sun and the Moon	**What causes the seasons?** *(RG) **Lost on the Moon** *(AP pages 26) **Moon Phases** *(GZ) **Lunar Landing Sites** *(TX page 752) **Earth-Sun Motion** *(TX page 680) **Crater Analysis** *(TX page 714)	**Chapter 26 Section 2** **Chapter 27** (Lab – Crater Analysis) **Chapter 28**	**SC.912.E.5.4** Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth. **S SC.912.E.5.5** Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary systems.

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	SC.E.1.4.1 The student understands the relationships between events on Earth and the movements of the Earth, its moon, the other planets, and the sun. **AA** **SC.E.1.4.2** The student knows how the characteristics of other planets and satellites are similar to and different from those of the Earth. **CBC: III.2.C, III.1.E, II.1.A, II.2.A**		**Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps) to emphasize topic • engage the students with the suggested "Lost on the Moon Activity"; allow the students to work independently and in groups in a discussion format. • using a globe and a flashlight, the teacher should demonstrate the rotation and revolution of the Earth and how they relate to day/night and seasons • using real data on tides for a specific month and a lunar phase chart, students will analyze data to determine the relationship between tidal height and Moon phase	**Oreo Cookie Lab** http://america2000challenge.org/lessonplans2/moon.htm **3-D Eclipse** *(GZ) **Eclipses** *(TX page 728) **Penumbra Effect** *(GZ) **Moon Watch Project** *(AP page 29) **LC: Mining on the Moon** *(TX page 753)		**C.912.E.5.6** Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other. **SC.912.E.7.4** Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans. **SC.912.P.12.2** Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time. **SC.912.P.12.4** Describe how the gravitational force between two objects depends on their masses and the distance between them.
Astronomy	**SC.C.1.4.1** The student knows that all motion is relative	aphelion **astronomical unit**	**The student will be able to:** • use power point to	**Planetary Model of the Solar System** *(AP page 20)	**Chapter 27**	**SC.912.N.1.3** Recognize that the strength or usefulness of a scientific

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Solar System • **The Planets**	to whatever frame of reference is chosen and that there is no absolute frame of reference from which to observe all motion. **SC.C.1.4.2** The student knows that any change in velocity is an acceleration. **SC.E.1.4.1** The student understands the relationships between events on Earth and the movements of the Earth, its moon, the other planets, and the sun. **AA** **SC.E.1.4.2** The student knows how the characteristics of other planets and satellites are similar to and different from those of the Earth. **SC.E.1.4.3** The	gas giant planet **Kelvin** perihelion **planet** planetesimal planetoid major planet minor planet **solar system** **Sun** terrestrial planet	describe the characteristics of the nine planets • describe the various components of the Sun • explain why Earth can support life and the possibility of life on other planets **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps) to emphasize topic • construct a scale distance model of the nine planets of the Solar System • complete the SpaceOle group research project • debate the controversy behind space exploration (economic issues, manned vs. unmanned explorations)	**Galilean Moons of Jupiter** *(TX page 750) **Space Ole** www.miamisci.org/spaceole **Planets Power Point Project** *(AP page 21) **The Nine Planets** www.nineplanets.org **Solar System Explorer** *(GZ) **Rotation/Revolution of Near Earth Planets** *(GZ) **MOLA Map of Mars** *(TX page 716)	**Chapter 28 Section 3**	claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented. **SC.912.N.2.4** Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. **SC.912.N.2.5** Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations)

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	student knows the various reasons that Earth is the only planet in our Solar System that appears to be capable of supporting life as we know it. **SC.H.1.4.2** The student knows that from time to time, major shifts occur in the scientific view of how the world works, but that more often the changes that take place in the body of scientific knowledge are small modifications of prior knowledge. **SC.H.1.4.3** The student understands that no matter how well one theory fits observations, a new theory might fit them as well or better, or might fit a wider range of observations,					of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations. **SC.912.N.3.1** Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. **SC.912.N.3.2** Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science. **SC.912.E.5.4** Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth. **SC.912.E.5.5** Explain the

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	because in science, the testing, revising, and occasional discarding of theories, new and old, never ends and leads to an increasingly better understanding of how things work in the world, but not to absolute truth. **SC.H.1.4.6** The student understands that, in the short run, new ideas that do not mesh well with mainstream ideas in science often encounter vigorous criticism and that, in the long run, theories are judged by how they fit with other theories, the range of observations they explain, how well they explain observations, and how effective they are in predicting new findings.					formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary systems. **SC.912.E.5.6** Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other. **SC.912.E.5.7** Relate the history of and explain the justification for future space exploration and continuing technology development. **SC.912.E.5.9** Analyze the broad effects of space exploration on the economy and culture of Florida. **SC.912.P.12.2** Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.

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	CBC: II.1.A, II.2.A, II.3.A, I.2.A, I.3.A, I.6.A, II.5.B					**SC.912.P.12.4** Describe how the gravitational force between two objects depends on their masses and the distance between them. **SC.912.L.18.12** Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
Astronomy **The Sun** **Stars** • **Black Holes** • **Stellar Evolution** • **Star Types** • **Stellar Distances**	**SC.C.1.4.1** The student knows that all motion is relative to whatever frame of reference is chosen and that there is no absolute frame of reference from which to observe all motion. **SC.C.2.4.4** The student knows that the forces that hold	absolute magnitude apparent magnitude binary star Cepheid variable **constellation** **electromagnetic waves** **electromagnetic radiation** **fission** **fusion**	**The student will be able to:** • calculate the distance between stars and the amount of time it takes for light to travel those distances • list various astronomical data gathering instruments • analyze star data and determine the relationship among the physical properties of stars	**H-R Diagram** *(GZ) **Modeling Fusion** *(TX page 756) **The Size of Our Sun** *(TX page 758) **LC: Total Solar Irradiance** *(TX page 762) **Energy of the Sun** *(TX page 770)	**Chapter 29** **Chapter 30** **Chapter 31**	**SC.912.N.3.5** Describe the function of models in science, and identify the wide range of models used in science. **SC.912.E.5.3** Describe and predict how the initial mass of a star determines its evolution. **SC.912.E.5.4** Explain the physical properties of the Sun and its dynamic nature

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EM Spectrum	the nucleus of an atom together are much stronger than electromagnetic force and that this is the reason for the great amount of energy released from the nuclear reactions in the sun and other stars. **SC.E.2.4.1** The student knows that the stages in the development of three categories of stars are based on mass: stars that have the approximate mass of our sun, stars that are two- to three-stellar masses and develop into neutron stars, and stars that are five- to six-stellar masses and develop into black holes. **SC.E.2.4.3** The student knows astronomical distance and time.	luminosity main sequence nebula neutron star parallax protostar **solar mass** **star** supernova wavelength	• classify stars according to temperature and luminosity, based on H-R diagram • compare and contrast the characteristics of the major star groups to develop understanding of Cosmology, star formation, and life and death of stars • predict the effects on Earth as the Sun exits it's main sequence stage **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps, Venn diagram) to emphasize topic • construct a children's storybook on the stages of a star • diagram the stages of a star • use an activity on the electromagnetic spectrum to explore the relationship between frequency, wavelength, and energy	**SXT Composite Image of the Sun** *(TX page 772) **The Angle of the Sun's Rays** *(TX page 673) **LC: The Genesis Mission** *(TX page 773) **Parallax** *(TX page 779) **Star Magnitudes** *(TX page 802) **Studying Stars in Formation** *(TX page 805)		and connect them to conditions and events on Earth. **SC.912.E.5.10** Describe and apply the coordinate system used to locate objects in the sky. **SC.912.E.5.11** Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations. **SC.912.P.10.10** Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear). **SC.912.P.10.18** Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications. **SC.912.P.10.21** Qualitatively

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	SC.E.2.4.4 The student understands stellar equilibrium. **SC.H.3.4.1** The student knows that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure. **SC.H.3.4.5** The student knows that the value of a technology may differ for different people and at different times. **CBC: II.3.B, II.7.B, III.3.F, III.7.F, II.4.B**		• using a star chart from the newspaper or a website, have the students identify constellations that are currently visible • plan a planetarium field trip or a star night at your school			describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver. **SC.912.P.12.2** Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time. **SC.912.P.12.7** Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
Astronomy **The Universe** **Galaxies**	**SC.B.2.4.1** The student knows that the structure of the universe is the result of interactions involving fundamental	asteroid black hole comet **galaxy** meteor meteor shower meteorite	**The student will be able to:** • classify the various types of galaxies according to Hubble's classification scheme • differentiate	**The Milky Way** *(TX page 804) **Planet Quest** http://planetquest.jpl.nasa.gov/index.cfm	**Chapter 30** **Chapter 31**	**SC.912.N.1.2** Describe and explain what characterizes science and its methods. **SC.912.E.5.1** Cite evidence used to develop and verify the scientific theory of the Big

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Other Celestial Bodies **Extra-Solar Planets**	particles (matter) and basic forces (energy) and that evidence suggests that the universe contains all of the matter and energy that ever existed. **SC.C.2.4.6** The student explains that all forces come in pairs commonly called action and reaction. **SC.D.1.4.1** The student knows how climatic patterns on Earth result from an interplay of many factors (Earth's topography, its rotation on its axis, solar radiation, the transfer of heat energy where the atmosphere interfaces with lands and oceans, and wind and ocean currents). **AA**	meteoroid quasar supercluster universe	between celestial bodies (asteroids, meteors, meteoroids, meteorites) • identify how galaxies are organized into clusters and superclusters • determine the size and shape of the Milky Way, as well as Earth's location within it **Teaching Strategies:** • perform provided laboratory activities • use CRISS strategies (e.g. two-column notes, concept maps) to emphasize topic • student presentations on selected celestial bodies (grading will be based on teacher-developed rubric) • watch select films on astronomical phenomena	**LC: Searching for Extraterrestrial Life** *(TX page 785**)**	**Chapter 29**	Bang (also known as the Big Bang Theory) of the origin of the universe. **SC.912.E.5.2** Identify patterns in the organization and distribution of matter in the universe and the forces that determine them. **SC.912.E.5.5** Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary systems. **SC.912.E.5.7** Relate the history of and explain the justification for future space exploration and continuing technology development. **SC.912.E.5.8** Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.

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	SC.E.2.4.2 The student identifies the arrangement of bodies found within and outside our galaxy. **SC.E.2.4.7** The student knows that mathematical models and computer simulations are used in studying evidence from many sources to form a scientific account of the universe. **SC.H.2.4.1** The student knows that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful, systemic study. **AA**					**SC.912.E.5.10** Describe and apply the coordinate system used to locate objects in the sky. **SC.912.E.5.11** Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations. **SC.912.P.12.3** Interpret and apply Newton's three laws of motion. **SC.912.P.12.4** Describe how the gravitational force between two objects depends on their masses and the distance between them. **SC.912.P.12.7** Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving. **SC.912.P.12.8** Recognize that Newton's Laws are a limiting case of Einstein's

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	SC.H.3.4.5 The student knows that the value of a technology may differ for different people and at different times. **CBC: III.2.C, III.1.E, II.6.B, II.1.B, II.10.B, III.4.F, III.7.F**					Special Theory of Relativity at speeds that are much smaller than the speed of light.

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