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Preface

Teams of Lake County teachers created the curriculum maps in order to ensure that all students throughout the district receive a common curriculum. The maps help ensure that all state requirements are taught and that the content is divided into teachable segments with appropriate pacing. The curriculum maps will guide your instruction but provide flexibility based on the individual needs of students. The maps are living documents and feedback is requested of teachers to ensure continuous improvement.

All teachers are expected to use the curriculum maps, in conjunction with data, to drive instruction. The maps were designed for the instruction to take place by quarter. There is some flexibility within the quarters for mastery and re-teaching. The expectation is that teachers will finish the content within each quarter in its entirety. The maps have been structured in such a way as to scaffold student learning.

Listed below are a few of the new or updated features common to all curriculum maps:

**Essential Question(s):**
- Provide application of the skills/concepts
- Have more than one right answer which promotes student discourse
- Increase the rigor in the classroom, by changing from teacher-centered to student-centered learning
- Are referred to at the beginning, middle, and end of the lesson
- Require you to make a decision
- Promote critical thinking and problem solving
- Encourage interdependence
- Are open-ended

**Academic Vocabulary** are:
- Unfamiliar vocabulary that are essential to understanding new content within explicit instruction
- Not necessarily the bold words in the chapter.
- Cumulative and continuously used throughout the year.
- Integrated into word walls, a research-based strategy that will facilitate vocabulary acquisition.
Common Board Configuration Elements (specific layouts may vary by sites, but must include each of these):

Purpose: For the student to know what is being taught and what the student will learn
- Date
- Benchmark
- Measurable, student-friendly objective
- Essential Question
- Bell work
- Agenda (Specific daily schedule)
- Homework
- Exit Strategy/Card

Lessons that infuse reading, writing, and discussion are imperative components of every subject area. There should be daily:
- Teacher to student and student to student discourse utilizing academic vocabulary.
- Reading and authentic writing
- Writing that includes higher-order thinking
- Incorporation of effective reading and writing instructional strategies

Maps are organized to include the following:
- Pacing
- Objective
- Essential questions, content and understanding, benchmarks, and assessment
- Appendix/ resources
Preface

Next Generation Sunshine State Standards

Science Benchmark Coding Scheme

<table>
<thead>
<tr>
<th>Subject</th>
<th>Grade Level</th>
<th>Body of Knowledge</th>
<th>Big Idea / Supporting Idea</th>
<th>Benchmark</th>
</tr>
</thead>
</table>

**Body of Knowledge Key**

N ~ Nature of Science  
E ~ Earth Space Science  
L ~ Life Science  
P ~ Physical Science

**Big Idea Key**

#1 – The Practice of Science  
#10 – Forms of Energy  
#2 – The Characteristics of Scientific Knowledge  
#11 – Energy Transfer and Transformation  
#3 – The Role of Theories, Laws, Hypotheses, and Models  
#12 – Moon Objects  
#4 – Science and Society  
#13 – Forces and Changes in Motion  
#5 – Earth in Space and Time  
#14 – Organization and Development of Living Organisms  
#6 – Earth Structures  
#15 – Diversity and Evolution of Living Organisms  
#7 – Earth Systems and Patterns  
#16 – heredity and Reproduction  
#8 – Properties of Matter  
#17 – Interdependence  
#9 – Changes in Matter  
#18 – Matter and Energy Transformations

**Language Arts and Mathematic Benchmarks**

The Language Arts and Mathematic benchmarks are in the course description. These benchmarks have been integrated throughout the curriculum map.

**Differentiated Instruction Strategies**

The following differentiated instruction strategies should be incorporated throughout the entire course:

- Cooperative Groups
- Computer Assisted Instruction
- Tiered Assignments
- Centers
- Flexible Grouping
- Curriculum Compacting/Contracts
- Learning Stations
- Scaffolding
- Hands-on Instruction
- Leveled Texts/Resources
- Teacher Led Small Groups
- Web Quest

Revised 6/2011
This chart is to show where the Big Ideas are located by grade level. This will help to give an understanding as to why complete coverage of the NGSSS at each grade level is essential!

<table>
<thead>
<tr>
<th>Big Idea #1</th>
<th>Big Idea #2</th>
<th>Big Idea #3</th>
<th>Big Idea #4</th>
<th>Big Idea #5</th>
<th>Big Idea #6</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Practice of Science</td>
<td>The Characteristics of Scientific Knowledge</td>
<td>The Role of Theories, Laws, Hypotheses, and Models</td>
<td>Science and Society</td>
<td>Earth in Space and Time</td>
<td>Earth Structures</td>
</tr>
</tbody>
</table>

| K | 1st | 1st | 1st | 1st | 1st |
| 1st | 2nd | 2nd | 2nd | 2nd | 2nd |
| 3rd | 3rd | 3rd | 3rd | 3rd | 3rd |
| 4th | 4th | 4th | 4th | 4th | 4th |
| 5th | 5th | 5th | 5th | 5th | 5th |
| 6th | 6th | 6th | 6th | 6th | 6th |
| 7th | 7th | 7th | 7th | 7th | 7th |
| 8th | 8th | 8th | 8th | 8th | 8th |
| HS | HS | HS | HS | HS | HS |

<table>
<thead>
<tr>
<th>#7 Earth Systems and Patterns</th>
<th>#8 Properties of Matter</th>
<th>#9 Changes in Matter</th>
<th>#10 Forms of Energy</th>
<th>#11 Energy Transfer and Transformations</th>
<th>#12 Motion of Objects</th>
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<tbody>
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<tr>
<th>#13 Forces and Changes in Motion</th>
<th>#14 Organization and Development of Living Organisms</th>
<th>#15 Diversity and Evolution of Living Organisms</th>
<th>#16 Heredity and Reproduction</th>
<th>#17 Interdependence</th>
<th>#18 Matter and Energy Transformations</th>
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</tbody>
</table>

Revised 6/2011
FOREWORD for Middle and High School Science

➢ Reading Writing Discussion in the classroom everyday (33% of R&W&D everyday)

This means that during each class period the students should be reading, writing, and talking about Science. Many of these overlap in a combination of Reading, Writing, and Discussion.

Reading Writing Discussion in the Science Classroom:

What do these look like in the Science classroom?

What DOES the reading process look like?

- Modeling - reading and thinking out loud
- Students in small groups or pairs
- Whole group when referring to a specific portion of the text
- Use of graphic organizers
- Reading and following lab instructions
- Reading a section for homework at home

What DOES the writing process look like?

- Lab report
- Small group or pairs jotting down important points
- Journal writing
- Answering selected questions from the textbook in complete sentences
- Completing graphic organizer
- Entry or Exit card
- Taking notes
- Writing prompt
- Responding to open ended questions

Revised 6/2011
FOREWORD for Middle and High School Science

What DOES the discussion process look like?
- Student discourse – discussion among and between the students about the topic (Could be in small group, pair, pair share, lecture {{should involve two way communication}})
- About labs, reading, current events, responses to open ended questions, essential questions, etc.
- Imbedding vocabulary terms/word wall, academic vocabulary, into the discussion

❖ The county approved textbook is a resource.

How to best use of the textbook to aid student comprehension:
- **At the beginning of each term** have the students participate in a “preview” of the textbook.
  - Table of contents
  - Chapter titles
  - Headings/subheadings
  - Graphics on the page, i.e. charts, graphs, pictures, maps tables,
  - Bold, italic, highlighted words
  - Glossary
  - Appendices

- **Incorporate the following for each chapter:**
  By doing the following you will enhance a student’s comprehension:
  - Before reading – preview, skim for new vocabulary, look at headings and subheadings, graphics,
  - During reading – Review the reading column of the chart for suggested activities.
  - After reading – Review writing and discussion columns of the chart for suggested activities.

Revised 6/2011
# Reading Writing Discussion in the Science Classroom

<table>
<thead>
<tr>
<th>Reading</th>
<th>Writing</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silent reading</td>
<td>Essential Question</td>
<td>Paired reading</td>
</tr>
<tr>
<td>At home reading</td>
<td>Cornell notes</td>
<td>Jig Saw</td>
</tr>
<tr>
<td>Oral</td>
<td>Small group notes</td>
<td>Think Pair Share</td>
</tr>
<tr>
<td>Read Aloud</td>
<td>Entry or Exit Card</td>
<td>Share out/Group presentations</td>
</tr>
<tr>
<td>Think Aloud</td>
<td>Graphic Organizers</td>
<td>*Lectures (should involve two way communication)</td>
</tr>
<tr>
<td>Lab instructions (pre, during, post)</td>
<td>Writing Prompt</td>
<td>Read Aloud</td>
</tr>
<tr>
<td>Silently Sustained Reading – student choice</td>
<td>Selected textbook questions (Answered with complete sentences)</td>
<td>Think aloud</td>
</tr>
<tr>
<td>Research paper</td>
<td>Worksheet</td>
<td>3-2-1Strategy</td>
</tr>
<tr>
<td>*Reading could be from textbook, current event, supplemental texts, websites, etc.</td>
<td>3-2-1Strategy</td>
<td>Lab Write up</td>
</tr>
<tr>
<td></td>
<td>Lab Write up</td>
<td>Lab instructions (pre, during, post)</td>
</tr>
<tr>
<td></td>
<td>Journal writing</td>
<td>Research paper</td>
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<td></td>
<td>Responding to open ended questions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Research paper</td>
<td></td>
</tr>
</tbody>
</table>

The above chart contains a sampling of suggestions and is not intended to be comprehensive.
FOREWORD for Middle and High School Science

- **Lab requirements:**
  - Teachers will complete the “List of labs” form and a copy of the form will be given to the department chair at the end of each quarter for both middle and high schools.
  - For **ALL middle school** Science courses:
    - a minimum of 8 labs per nine weeks
  - For **high school** Science course:
    - For Regular courses – 1 per week
    - For Honors courses – 2 per week

- **Research paper requirements:**
  - All Science courses in Lake County will complete a Science research paper for the content area of the course.

- **Science Fair or Competition:**
  - All middle (6 – 7) and high schools have the traditional Science Fair option for all grade levels to participate. All 8th graders are to complete a Science Fair Project. Each school has a Science Fair Coordinator to help with the process for the students and the teachers.
  - There are additional types of “Science” competitions, different from the traditional Science Fair at some schools, that students are encouraged to participate.

- **Board Approved Programs:**
  - At High School this is through the HOPE course.
  - Human Growth and Development

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### H.S. Earth Space Pacing Guide

<table>
<thead>
<tr>
<th>First Quarter</th>
<th>Second Quarter</th>
<th>Third Quarter</th>
<th>Fourth Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FCIM/Focus Calendar</strong></td>
<td><strong>FCIM/Focus Calendar</strong></td>
<td><strong>FCIM/Focus Calendar</strong></td>
<td><strong>FCIM/Focus Calendar</strong></td>
</tr>
<tr>
<td><strong>1) The Nature of Science</strong></td>
<td><strong>4) The Dynamic Earth</strong></td>
<td><strong>7) Weathering &amp; Erosion</strong></td>
<td><strong>9) Space &amp; Solar System</strong></td>
</tr>
<tr>
<td>A. Lab/Classroom Safety-Flinn Safety test and contract</td>
<td>A. Plate Tectonics</td>
<td>A. Types of Weathering</td>
<td>A. History &amp; Future of Space Exploration</td>
</tr>
<tr>
<td>B. Scientific Method and posing scientific problems</td>
<td>• Continental Drift</td>
<td>• Soil</td>
<td>B. Instruments &amp; Technology</td>
</tr>
<tr>
<td>C. What is science? What is Pseudoscience?</td>
<td>• Plate Boundaries</td>
<td>• Glaciers</td>
<td>• Telescope</td>
</tr>
<tr>
<td>D. Theories, laws, models and hypotheses</td>
<td>• Geological Features</td>
<td>• Wind</td>
<td>• Spectroscopy &amp; E&amp;M Spec</td>
</tr>
<tr>
<td>E. Science &amp; Scientists</td>
<td>B. Earthquakes</td>
<td>• Water</td>
<td>C. Earth's Orbit</td>
</tr>
<tr>
<td>F. Science &amp; Society</td>
<td>• Seismic Waves</td>
<td>• Glaciers, Valleys, Canyons, Riverbeds</td>
<td>• Kepler's Laws</td>
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<tr>
<td>&amp;</td>
<td>• Seismographs</td>
<td>• Florida’s Land Changes</td>
<td>• Newton's Law of Circular Motion</td>
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<td>&amp;</td>
<td>• Warning Systems</td>
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<td>• Seasons</td>
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<td></td>
<td>C. Volcanoes</td>
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<td>D. Solar System</td>
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<td></td>
<td>• Volcanic Regions</td>
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<td>• Formation of Solar System</td>
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<tr>
<td></td>
<td>• Types of Eruptions</td>
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<td>• Formation of Earth, Atmosphere &amp; Oceans</td>
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<td>• Predicting Eruptions &amp; Warning Systems</td>
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<td>• Formation of Earth’s Moon</td>
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<td></td>
<td>• Other Planetary Systems</td>
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<tr>
<td></td>
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<td>• Moon and Tides</td>
</tr>
<tr>
<td><strong>5) History of Earth</strong></td>
<td><strong>B. Climate</strong></td>
<td><strong>C. The Universe</strong></td>
<td><strong>10) Sun, Stars &amp; Universe</strong></td>
</tr>
<tr>
<td>A. Fossil Records</td>
<td>• Factors affecting Climate</td>
<td></td>
<td>A. The Sun</td>
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<tr>
<td>B. Geologic Dating</td>
<td>• Global Climate Change</td>
<td></td>
<td>• Composition</td>
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<tr>
<td>C. Radioactive Decay</td>
<td>• Global wind belts</td>
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<td>• Solar Activity</td>
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<td>• Sunspots</td>
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<td>B. The Stars</td>
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<td>• Life Cycles of Stars</td>
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<td>• Types of Stars</td>
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<td>C. The Universe</td>
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<td>• Formation of the Universe</td>
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<td>• Galaxies</td>
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<td>• Constellations</td>
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<td><strong>6) Oceans</strong></td>
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<td></td>
<td><strong>11) Minerals &amp; Rocks</strong></td>
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<tr>
<td>A. Features</td>
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<td>(Optional Unit)</td>
</tr>
</tbody>
</table>
| B. Motions of Water | | | A. Minerals *
| | | | * Identification of Minerals |
| | | | * Properties of Minerals |
| | | | B. Rocks *
| | | | * Rock Cycle |
| | | | * Igneous Rocks |
| | | | * Sedimentary Rocks |
| | | | * Metamorphic Rocks |
| | | | C. Minerals *
| | | | * Identification of Minerals |
| | | | * Properties of Minerals |
| | | | D. Rocks *
| | | | * Rock Cycle |
| | | | * Igneous Rocks |
| | | | * Sedimentary Rocks |
| | | | * Metamorphic Rocks |

**Revised 6/2011**

NGSSS used throughout the course: LA.910.2.2.3; LA.910.4.2.2; MA.912. S.1.2; MA.912.S.3.2
### Essential Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Essential Content &amp; Understandings</th>
<th>Essential Skills &amp; Benchmarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why is lab safety important?</td>
<td><strong>1) The Nature of Science</strong>&lt;br&gt;A. Safety</td>
<td>SC.912.N.1.2 Describe and explain what characterizes science and its methods. 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.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.3.4 Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions. 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.</td>
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<tr>
<td>Develop a logical argument to show how scientists use the scientific method as an organized system to solve a problem.</td>
<td><strong>B. Scientific Method</strong></td>
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<td>Differentiate between a scientific theory and a scientific law.</td>
<td><strong>C. Science &amp; Scientists</strong></td>
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<tr>
<td>Critique several lab scenarios for correct and incorrect lab procedures</td>
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<tr>
<td>Prove that scientists use checks and balances to increase accuracy of their findings by providing at least 2 examples?</td>
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<tr>
<td>What might cause changes in accepted scientific ideas and theories?</td>
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</tbody>
</table>

**Assessment**

- **Formal:** Describe the function of models in science, and identify the wide range of models used in science.
  - Chapter Test
  - Quizzes

- **Informal:**
  - Labs & Lab Reports
  - Worksheets
  - Group Work
  - Flinn Lab Safety Contract

- **Labs:**
  - Gummy Bear Lab: appendix D

- **Other:** See Appendix A

**Word Wall activity:**
- Safety Symbols
- Scientific theory
- Scientific law
### Essential Questions

<table>
<thead>
<tr>
<th>Essential Questions</th>
<th>Essential Content &amp; Understandings</th>
<th>Essential Skills &amp; Benchmarks</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.912.N.1.5</td>
<td>Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.</td>
<td>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 have the potential to add new evidence to support one or another of the explanations.</td>
<td>Hypothesis Independent variable Dependent variable Peer review Observations Conclusion -ology Inductive reasoning Deductive reasoning</td>
</tr>
<tr>
<td>Essential Questions</td>
<td>Essential Content &amp; Understandings</td>
<td>Essential Skills &amp; Benchmarks</td>
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<td>---------------------------------------------------------------------------------------------</td>
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<tr>
<td>What is science?</td>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Construct a scientific model and explain how it is used?</td>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Explore how science and society interact and how each affects the other.</td>
<td>D. Science &amp; Society</td>
<td>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).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SC.912.N.2.3 Identify examples of pseudoscience (such as astrology, phrenology) in society.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>SC.912.N.3.5 Describe the function of models in science, and identify the wide range of models used in science.</td>
<td></td>
</tr>
</tbody>
</table>
### H.S. Earth Space

**Topics:** Nature of Science, Earth Basics, and Earth Chemistry  
**Time Frame:** First Quarter

<table>
<thead>
<tr>
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<th>Essential Skills &amp; Benchmarks</th>
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<td><strong>Assessment</strong></td>
</tr>
</tbody>
</table>
| **2) Earth Basics** | **A. Intro to E/S Science** | SC.912.N.4.1 Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. | **Formal:**  
Chapter Test  
Quizzes |
| | **B. Earth's Interior** | SC.912.E.6.1 Describe and differentiate the layers of Earth and the interactions among them. | **Informal:**  
Labs & Lab Reports  
Worksheets  
Group Work |
| | **C. Magnetism & Gravity**  
● 4 Fundamental Forces | SC.912.P.10.16 Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies. | **Labs:**  
Earth Foldable: See Website in Appendix C  
Other: See Appendix A |
| | | SC.912.E.5.2 Identify patterns in the organization and distribution of matter in the universe and the forces that determine them. | **Word Wall activity:**  
Magnetosphere  
Atmosphere  
Hydrosphere  
Cryosphere  
Geosphere  
Biosphere  
Thermodynamics  
Lithosphere |
| | | SC.912.P.10.10 Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear). | |
### Essential Questions

- Differentiate the matter and energy transfer between an open and a closed system and provide an example of each system.

- Create a graphic organizer showing how Earth's five spheres interact with each other?

- What are the Laws of Thermodynamics and do they support the theories of the origin of life?

- Compare the different ways heat can be transferred?

### Essential Content & Understandings

#### D. Earth’s Five Spheres

- SC.912.E.7.3 Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.

### Essential Skills & Benchmarks

- SC.912.P.10.16 Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.

- 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.

- SC.912.E.7.1 Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.

- SC.912.L.15.8 Describe the scientific explanations of the origin of life on Earth.

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**Revised 6/2011**

NGSSS used throughout the course: LA.910.2.3; LA.910.4.2.2; MA.912. S.1.2; MA.912.S.3.2
### Essential Questions

<table>
<thead>
<tr>
<th>Question</th>
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<tbody>
<tr>
<td>What are the energy sources of Earth and how does energy cycle on Earth?</td>
</tr>
<tr>
<td>What are the four states of matter?</td>
</tr>
<tr>
<td>What is the basic structure of an atom?</td>
</tr>
<tr>
<td>How do electrons form chemical bonds between atoms?</td>
</tr>
<tr>
<td>What are Earth’s natural resources; both renewable and non-renewable?</td>
</tr>
<tr>
<td>Differentiate between fission and fusion.</td>
</tr>
</tbody>
</table>

### Essential Content & Understandings

<table>
<thead>
<tr>
<th>Topic</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>F. Earth’s Cycles</td>
<td></td>
</tr>
<tr>
<td>- water</td>
<td></td>
</tr>
<tr>
<td>- carbon</td>
<td></td>
</tr>
<tr>
<td>3) Earth Chemistry, Resources &amp; Energy</td>
<td></td>
</tr>
<tr>
<td>A. Earth Chemistry</td>
<td></td>
</tr>
<tr>
<td>- 4 States of Matter</td>
<td></td>
</tr>
<tr>
<td>- Atomic Theory</td>
<td></td>
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<tr>
<td>B. Resources &amp; Energy</td>
<td></td>
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<tr>
<td>- Nonrenewable Energy</td>
<td></td>
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<tr>
<td>- Fission &amp; Fusion</td>
<td></td>
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<tr>
<td>- Renewable Energy</td>
<td></td>
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<tr>
<td>- Conservation</td>
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</table>

### Essential Skills & Benchmarks

<table>
<thead>
<tr>
<th>Benchmarks</th>
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</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>SC.912.E.7.1   Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.</td>
</tr>
<tr>
<td>SC.912.P.8.1   Differentiate among the four states of matter.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>SC.912.P.10.11  Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated</td>
</tr>
</tbody>
</table>

### Assessment

<table>
<thead>
<tr>
<th>Formal:</th>
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</thead>
<tbody>
<tr>
<td>- Chapter Test</td>
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<tr>
<td>- Quizzes</td>
</tr>
<tr>
<td>Informal:</td>
</tr>
<tr>
<td>- Labs &amp; Lab Reports</td>
</tr>
<tr>
<td>- Worksheets</td>
</tr>
<tr>
<td>- Group Work</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lab:</th>
</tr>
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<tbody>
<tr>
<td>- Blowing in the Wind Project, attached-appendix D (possible project to meet the SC.912.N.1.1 benchmarks. Others may</td>
</tr>
</tbody>
</table>

Revised 6/2011

NGSSS used through out the course: LA.910.2.3; LA.910.4.2.2; MA.912. S.1.2; MA.912.S.3.2
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<tbody>
<tr>
<td></td>
<td>with them and their associated safety issues.</td>
<td><strong>SC.912.N.1.1</strong> 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, 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.</td>
<td>be used as well.)</td>
</tr>
<tr>
<td></td>
<td><strong>Word Wall Activity:</strong> Proton Neutron Electron Nucleus Periodic Table Plasma Ion Isotope Atomic number Mass number Valence electron Ionic bond Covalent bond Recycling Conservation Nuclear fission Nuclear fusion</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Essential Questions
1. Investigate the movements of the tectonic plates and how they change the Earth’s surface.
2. Apply the concepts learned to explain why earthquakes generally occur at the plate boundaries.
3. How do scientists forecast risks from earthquakes and volcanoes?
4. Summarize how a volcano forms.
5. List different types of volcanic eruptions.

### Essential Content & Understandings

#### 4) The Dynamic Earth

<table>
<thead>
<tr>
<th>A. Plate Tectonics</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Continental Drift</td>
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<tr>
<td>• Plate Boundaries</td>
</tr>
<tr>
<td>• Geological Features</td>
</tr>
</tbody>
</table>

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<tr>
<th>B. Earthquakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Seismic Waves</td>
</tr>
<tr>
<td>• Seismographs</td>
</tr>
<tr>
<td>• Warning Systems</td>
</tr>
</tbody>
</table>

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<tr>
<th>C. Volcanoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Volcanic Regions</td>
</tr>
<tr>
<td>• Types of Eruptions</td>
</tr>
<tr>
<td>• Predicting Eruptions &amp; Warning Systems</td>
</tr>
</tbody>
</table>

### Essential Skills & Benchmarks

- SC.912.E.6.1 Describe and differentiate the layers of Earth and the interactions among them.
- 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.P.10.16 Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
- 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.

### Assessment

- **Formal:**
  - Chapter Test
  - Quizzes

- **Informal:**
  - Labs & Lab Reports
  - Worksheets
  - Group Work

- **Labs:**
  - Seismograph & Seismogram, attached

- **Other:** See Appendix A

- **Word Wall Activity:**
  - Continental Drift
  - Lithosphere
  - Asthenosphere
  - Divergent Boundary
  - Convergent Boundary
  - Transform Boundary
  - Focus
  - Epicenter
  - Volcanism
  - Pyroclastic Material

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**Revised 6/2011**

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</table>
| Identify how fossils can be used to determine the age of rocks? | 5) **History of Earth**  
  A. Fossil Records  
  B. Geologic Dating  
  C. Radioactive Decay | 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.P.10.11 Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.  
LA.910.2.2.3 The student will organize information to show understanding or relationships among facts, ideas, and events (e.g., representing key points within text through charting, mapping, paraphrasing, summarizing, comparing, contrasting, or outlining) | Formal:  
Chapter Test  
Quizzes  
Informal:  
Labs & Lab Reports  
Worksheets  
Group Work  
Labs:  
Geologic Time Scale, attached-appendix D  
Other: See Appendix A  
**Word Wall Activity:**  
Paleontology  
Carbon dating  
Radiometric dating  
Alpha  
Beta  
Gamma  
Half-life  
Radioactive parent  
Stable daughter |

NGSSS used through out the course: LA.910.2.3; LA.910.4.2.2; MA.912. S.1.2; MA.912.S.3.2
### Essential Questions

Analyze various ways that scientists study the oceans and be able to identify at least 2 different methods.

Investigate the various movements of water in the oceans.

### Essential Content & Understandings

6) Oceans

**D. Features**

**E. Motions of Water**

**SC.912.E.6.5** Describe the geologic development of the present day oceans and identify commonly found features.

**SC.912.E.7.2** Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.

**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.

**MA.912.S.3.2** Collect, organize, and analyze data and present visual summaries from the following:

- bar graphs
- line graphs
- stem and leaf plots
- circle graphs
- histograms
- box and whisker plots
- scatter plots
- cumulative frequency (ogive) graphs

### Assessment

**Formal:**
- Chapter Test
- Quizzes

**Informal:**
- Labs & Lab Reports
- Worksheets
- Group Work

**Labs:**

**Other:** See Appendix A

### Word Wall Activity:

Oceanography
Sonar
Continental Margin
Deep-Ocean Basin
Trench
Density
Current
Surface Current
Wave
Wave Period
Refraction
Tide
Tidal Current
Tidal Oscillation

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Revised 6/2011

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<tbody>
<tr>
<td>Identify the main types of weathering?</td>
<td><strong>7) Weathering &amp; Erosion</strong></td>
<td>SC.912.E.6.2 Connect surface features to surface processes that are responsible for their formation.</td>
<td><strong>Formal:</strong> Chapter Test Quizzes</td>
</tr>
<tr>
<td>Differentiate between mechanical and chemical weathering. Be able to give 2 examples.</td>
<td>A. Types of Weathering</td>
<td>SC.912.E.6.4 Analyze how specific geologic processes and features are expressed in Florida and elsewhere.</td>
<td><strong>Informal:</strong> Labs &amp; Lab Reports Worksheets Group Work</td>
</tr>
<tr>
<td>What types of surface features result from weathering, especially in Florida?</td>
<td>a. Surface Features</td>
<td></td>
<td><strong>Labs:</strong> Differential Weathering, attached-appendix D</td>
</tr>
<tr>
<td>Identify at least 3 forms of erosion and then choose 1 method of conservation and prove that it works (design a model)</td>
<td></td>
<td></td>
<td>Other: See Appendix A</td>
</tr>
</tbody>
</table>

**Word Wall Activity:** Weathering Mechanical Weathering Chemical Weathering Differential Weathering Oxidation Hydrolysis Soil Profile Humus Erosion Calcites Silicates Groundwater Aquifer

NGSSS used throughout the course: LA.910.2.3; LA.910.4.2.2; MA.912. S.1.2; MA.912.S.3.2
**H.S. Earth Space**

**Topics:** Weathering & Erosion and Weather & Climate  
**Time Frame:** Third Quarter

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</thead>
</table>
| Analyze how a severe weather system forms by breaking it into the various components? | SC.912.E.7.5  Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions. | Formal:  
Chapter Test  
Quizzes |
| Apply the weather concepts learned to predict weather when given a scenario and then analyze the limitations of the given predictions? | SC.912.E.7.6  Relate the formation of severe weather to the various physical factors. |
| Investigate how the weather and climate in Florida have influenced human behavior? | SC.912.E.7.4 Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans. | Informal:  
Labs & Lab Reports  
Worksheets  
Group Work |
| Identify factors affect climate? | SC.912.E.7.7 Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change. | Labs:  
Other: See Appendix A |
| How do perceived climate changes influence society including governmental agencies? | SC.912.E.7.8 Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively. |
| Construct a model of the layers of the atmosphere making sure to differentiate the temperature, pressure and chemical composition in each layer. | 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. | Word Wall Activity:  
Stratus  
Cumulus  
Cirrus  
Nimbo-Alto  
Cloud seeding  
Dew point  
Humidity  
Hurricane  
Polar/Tropical  
Continental/Maritime  
Watch/Warning  
Global warming  
Carbon dioxide |
| Summarize the processes of conduction, convection, and radiation | | | |

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**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.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.7.7** Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.

**SC.912.E.7.8** Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.

**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.
### H.S. Earth Space

**Topics:** Weathering & Erosion and Weather & Climate  
**Time Frame:** Third Quarter  

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<tr>
<td><strong>FOURTH Quarter</strong></td>
<td><strong>9) Space &amp; Solar System</strong></td>
<td><strong>FOURTH Quarter</strong></td>
<td><strong>FOURTH Quarter</strong></td>
</tr>
</tbody>
</table>
|                     | A. History & Future of Space Exploration | SC.912.E.5.7 Relate the history of and explain the justification for future space exploration and continuing technology development. | **Formal:**  
|                     | B. Instruments & Technology        | SC.912.E.5.8 Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools. |  
|                     |   - Telescope                      | SC.912.E.5.9 Analyze the broad effects of space exploration on the economy and culture of Florida. | **Informal:**  
|                     |   - Spectroscopy & E&M Spectrum    | SC.912.E.5.11 Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations. |  
|                     |   - Effect on Florida              | 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.10.19 Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not. | **Labs:**  
|                     |                                    | It's A Long Way To Pluto, attached-appendix D |  
|                     |                                    | Other: See Appendix A |  
|                     |                                    | **Word Wall Activity:**  
|                     |                                    | Astronomy  
|                     |                                    | Cosmology  
|                     |                                    | Optical telescope  
|                     |                                    | Reflecting telescope  
|                     |                                    | Refracting telescope  
|                     |                                    | Astronomical unit  
|                     |                                    | Light year  
|                     |                                    | Electromagnetic spectrum  
|                     |                                    | Sputnik  
|                     |                                    | Neil Armstrong  
|                     |                                    | Yuri Gagarin  
|                     |                                    | Alan Shepard  
|                     |                                    | Kennedy Space Center  

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Revised 6/2011  
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</table>
| What are Kepler’s three laws of planetary motion? | C. Earth’s Orbit  
- Keplers Laws  
- Newton’s Law of Circular Motion  
- Seasons | 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. | Formal:  
Chapter Test  
Quizzes |
| How does Newton’s law of circular motion relate to the motion of Earth, Moon and Sun? | D. Solar System  
- Formation of Solar System  
- Formation of Earth, Atmosphere & Oceans  
- Formation of Earth’s Moon  
- Other Planetary Systems  
- Moon and Tides | 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. | Informal:  
Labs & Lab Reports  
Worksheets  
Worksheets |
| How does the tilt of Earth’s axis and Earth’s movement cause the seasons? | | 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. | Labs:  
Other: See Appendix A |
| How was the Solar System, the Earth and the moon formed? | | 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. | Word Wall Activity:  
Photosphere  
Chromosphere  
Corona  
Convection Zone  
Radiative Zone  
Sunspots  
Sun flare  
Prominence  
Coronal mass ejection  
Geomagnetic storm  
Aurora  
Doppler effect  
H-R Diagram  
Main sequence  
Red giant  
Supernova  
Protostar  
Stellar equilibrium  
Black hole |
| How does the moon affect the ocean? | | SC.912.E.6.5 Describe the geologic development of the present day oceans and identify commonly found features. | |
| Analyze the components of the sun? | 10) Sun, Stars & Universe  
A. The Sun  
- Composition  
- Solar Activity  
- Sunspots | 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. | |
| How do the activities of the sun affect Earth and its life? | B. The Stars  
- Life Cycles of Stars  
- Types of Stars  
- Measurements | SC.912.E.5.3 Describe and predict how the initial mass of a star determines its evolution. | |
| Use a graphic organizer or flow chart to diagram the life cycle of a star. | | SC.912.E.5.11 Distinguish the various | |

Revised 6/2011

NGSSS used throughout the course: LA.910.2.3; LA.910.4.2.2; MA.912. S.1.2; MA.912.S.3.2
### Essential Questions

- What evidence supports the Big Bang Theory?
- How is the Universe organized?
- What are the different types of galaxies and their properties?

### Essential Content & Understandings

<table>
<thead>
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<th>C. The Universe</th>
<th>Essential Skills &amp; Benchmarks</th>
<th>Assessment</th>
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<tbody>
<tr>
<td>● Formation of the Universe</td>
<td>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.</td>
<td>White dwarf</td>
</tr>
<tr>
<td>● Galaxies</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>● Constellations</td>
<td>LA.910.2.2.3 The student will organize information to show understanding of relationships among facts, ideas, and events (e.g., representing key points within text through charting, mapping, paraphrasing, summarizing, comparing, contrasting, or outlining)</td>
<td></td>
</tr>
</tbody>
</table>

NGSSS used throughout the course: LA.910.2.3; LA.910.4.2.2; MA.912.S.1.2; MA.912.S.3.2

Revised 6/2011
# Appendix A – Correlation to Textbook

## FIRST QUARTER

<table>
<thead>
<tr>
<th>Labs correlated to Holt Earth Science Textbook</th>
<th>Computer Ideas</th>
<th>Foldable / Manipulative Ideas</th>
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<tbody>
<tr>
<td>Sample Size &amp; Accuracy – Page 12</td>
<td>PENDA</td>
<td>Safety Symbol mobiles or posters</td>
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<tr>
<td>Modeling the Water Cycle – Page 409</td>
<td></td>
<td>Independent and dependent variables-2 flap foldable</td>
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<tr>
<td>Testing the conservation of Mass – Page 46</td>
<td>Thinkquest to find a long term project</td>
<td>Layers of the Earth concentric circle foldable</td>
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<tr>
<td>Liquid and solid cores-Page 788</td>
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## SECOND QUARTER

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<tr>
<td>Sea-Floor Spreading – Page 282</td>
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<td>Accordion foldable diagramming the sea floor</td>
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<tr>
<td>Continental Collisions – Page 308</td>
<td>PENDA</td>
<td>Puzzle pieces showing Earth’s plates (Pangaea to modern day)</td>
</tr>
<tr>
<td>Tectonic plate boundaries-Page 273</td>
<td>Mountain Maker/Earth Shaker <a href="http://www.teachersdomain.org">www.teachersdomain.org</a></td>
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</tr>
<tr>
<td>What’s Your Relative Age? – Page 202</td>
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<td>Waves-Page 697</td>
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## THIRD Quarter

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<tbody>
<tr>
<td>Wind Chill – Page 584</td>
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<td>Climate flip books</td>
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<tr>
<td>Mechanical Weathering – Page 375</td>
<td>PENDA</td>
<td>Layers of the atmosphere layered foldable</td>
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<tr>
<td>Energy Absorption and Reflection-Page 532</td>
<td></td>
<td>Land/Sea breeze 2 flap foldable</td>
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<tr>
<td>Factors that Affect Climate-Page 622</td>
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## Appendix A –
Labs Correlated to the Present Textbook

### FOURTH QUARTER

<table>
<thead>
<tr>
<th>Lab Title</th>
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<tbody>
<tr>
<td>A Model Pendulum</td>
<td>730</td>
<td>Layers of the sun concentric circle foldable</td>
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<tr>
<td>The Angle of the Sun’s Rays</td>
<td>735</td>
<td>Oreo Cookie/phases of the moon lab. <a href="http://analyzer.depaul.edu/paperplate/Oreo%20Moon%20Phases.htm">http://analyzer.depaul.edu/paperplate/Oreo%20Moon%20Phases.htm</a></td>
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<tr>
<td>Earth-Sun Motion</td>
<td>738</td>
<td>Chain of events chart on the formation of the Earth</td>
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<tr>
<td>Parallax</td>
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<td>PENDA</td>
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<tr>
<td>The Expanding Universe</td>
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<td>Eclipsesi</td>
<td>794</td>
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<td>Modeling Fusion</td>
<td>825</td>
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## Appendix B –
Book List By Topics

<table>
<thead>
<tr>
<th>Book Title</th>
<th>Author</th>
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<tbody>
<tr>
<td>October Sky</td>
<td>Homer Hickam</td>
</tr>
<tr>
<td>Kepler: A Novel</td>
<td>John Banville</td>
</tr>
</tbody>
</table>
Appendix C
Web Sites By Topics

www.nsta.org  National Science Teachers Association


http://www.iris.washington.edu/hq/programs/education_and_outreach/aotm  #9 Dynamic Earth

http://www.fldoestem.org  Florida STEM (Science, Technology, Engineering, Math)

http://disney.go.com/disneynature/earth/  Lesson Plans for Disney Film, EARTH

http://www.worldwidetelescope.org/  Space Exploration


http://teamteam.pbwiki.com/Bad+science+in+The+Day+After+Tomorrow  Global Warming

http://www.wunderground.com/education/thedayafter.asp  Global Warming

http://www.csmonitor.com/2004/0528/p01s04-sten.html  Global Warming

http://galileo.phys.virginia.edu/Education/outreach/8thgradesol/home.htm

http://www.teachersdomain.org/resource/ess05.sci.ess.earthsys.lp_platetectonics/
Appendix D
Labs and Activities From Within the Map – By Quarters

Earth/Space Science – First Quarter

GUMMY BEAR LAB

SSS (Number and Benchmark):
SC.912.N.1.2
SC.912.N.1.6
SC.912.N.1.7

Materials Needed:
• one gummy bear
• measuring stick
• paper towels
• cup
• marker
• water
• triple balance beam
• calculator

Safety Concerns/Issues:
Must have a signed safety contract on file
Overnight storage of each groups’ cups: Clean up

Procedures

INTRODUCTION:
In this lab you will make a hypothesis that is your answer to the proposed question; then you will test your hypothesis by making measurements.

QUESTION:
WHAT DO YOU THINK WILL HAPPEN TO A GUMMY BEAR WHEN YOU PUT IT IN WATER OVER NIGHT?

HYPOTHESIS: (Write your hypothesis)

PROCEDURE
1. Choose one gummy bear from the container
2. Use the equipment available to measure your gummy bear
3. Make each of the measurements listed below
4. Record the data in the chart for Day 1

MEASUREMENTS:
• The length of your gummy bear should be measured from the top of its head to the bottom of its feet to the nearest tenth of a centimeter
• Measure the width at the widest point across the back of the bear to the nearest tenth of a centimeter
• Measure the thickness from the front of the back at the thickest point to the nearest tenth of a cm
• Calculate the volume by multiplying the length, width, and thickness. Round to the nearest hundredth
• Measure the mass using a triple-beam balance or other scale to the nearest tenth of a gram
• Calculate the density by dividing the mass by the volume. Round you answer to the nearest hundredth
Appendix D
Labs and Activities From Within the Map – By Quarters

PROCEDURE CONTINUED
5. Put the bear in a cup labeled with your names and class period
6. Add 50 ml of water to the cup and allow it to sit over night
7. On Day 2, remove the gummy bear from the cup of water and use a paper towel to dry it
8. Repeat the same measurements as above and record in the correct portion of the chart
9. Determine the amount of change for each measurement and record in the chart

Experimental Data:

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<tr>
<th></th>
<th>Color</th>
<th>Length</th>
<th>Width</th>
<th>Thickness</th>
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<th>Mass</th>
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<td>DAY 1</td>
<td></td>
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<tr>
<td>DAY 2</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount of Change</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ANALYSIS:
1. Was your hypothesis correct? Explain.
2. Which change is greater – volume or mass? Explain.
3. Was there a change in density? Why?
4. How do your results compare to those of your classmates?

CONCLUSION: (Write your conclusion here. Remember that a conclusion ANSWERS the question.)

Assessment of Student Learning:
Grade on the finished lab; participation in lab

Teacher Reflection:
Students enjoy this lab and the results are surprising to some, which emphasizes the process of making a hypothesis.

Created by: Tavares High School Science Dept  Date: 2009
Appendix D
Labs and Activities From Within the Map – By Quarters

Earth/Space Science – First Quarter
BLOWING IN THE WIND
(adapted from Earth Science, Holt, Copyright 2006)

**SSS (Number and Benchmark):**
SC.912.N.1.1

**Materials Needed:**
See below

**Safety Concerns/Issues:**
Must have a signed safety contract on file

**Procedures**
See below

**Assessment of Student Learning:**
Suggested Rubric

<table>
<thead>
<tr>
<th>LAB: BLOWING IN THE WIND</th>
<th>Rubric</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category</strong></td>
<td><strong>Comments</strong></td>
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<tr>
<td>Brainstorm Sheet</td>
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</tr>
<tr>
<td>Best Hypothesis</td>
<td>5</td>
</tr>
<tr>
<td>Bring Materials</td>
<td>3</td>
</tr>
<tr>
<td>Quality of Construction</td>
<td>6</td>
</tr>
<tr>
<td>Windmill able to lift load</td>
<td>6</td>
</tr>
<tr>
<td>Meets Deadlines</td>
<td>15</td>
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<tr>
<td>Brainstorm Sheet – 3</td>
<td>Sketch of Best Hypothesis - 3</td>
</tr>
<tr>
<td>Materials to Class – 3</td>
<td>Windmill Blades – 3</td>
</tr>
<tr>
<td>Ready to Test – 3</td>
<td></td>
</tr>
<tr>
<td>Works well with Teammates</td>
<td>3</td>
</tr>
<tr>
<td>Finished Lab Write-Up</td>
<td>7</td>
</tr>
<tr>
<td>Time on Task</td>
<td>10</td>
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<tr>
<td>Includes absences, tardies, and being on task during team time</td>
<td></td>
</tr>
<tr>
<td><strong>Total Points:</strong></td>
<td>60</td>
</tr>
</tbody>
</table>

**Teacher Reflection:**
Great project. Lasts 3 to 5 class periods, or partial class periods. Competition adds excitement. Prizes are a good idea.

**Created by:** Tavares High School Science Dept  **Date:** 2009
MEMO
To: Division of Research and Development
Quixote Alternative Energy Systems is accepting design proposals to develop a windmill that can be used to lift window washers to the tops of buildings. As part of the design engineering team, your division has been asked to develop a working model of such a windmill. Your task is to design and build a model that can lift 30 large paper clips a vertical distance of 50 cm. The job will be given to the team whose model can lift the paper clips the fastest.

OBJECTIVES
Prepare a detailed sketch of your solution to the design problem.
Design and build a functional windmill that lifts a specific weight as quickly as possible.

MATERIALS
• blow dryer, 1,500 W
• dowel or smooth rod
• foam board or cardboard
• glue, white
• paper clips, large (30)
• paper cup, small (1)
• spools of thread, empty (2)
• string, 50 cm

Suggested materials for windmill blades: Provided by Team
foam board, paper plates, paper cups, or any other lightweight materials

SAFETY: MUST HAVE A SIGNED SAFETY CONTRACT ON FILE

ASK A QUESTION
What question is being asked here? Write out the question that is being asked.

_____________________________________________
_____________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________

FORM A HYPOTHESIS
1. Brainstorm (by yourself) some designs of a windmill using only the materials listed above. This is homework and must be done prior to discussion with your group. Sketch your ideas on the “BRAINSTORM” sheet provided. A minimum of two ideas (drawings and explanations) is required for credit.
2. Bring all brainstorm ideas to your team. As a team, decide which idea is the best and which you will build. Remember to consider what materials will be needed and that the team must provide those materials.
3. Sketch your final design on the “SKETCH OF BEST HYPOTHESIS” sheet provided.
4. The “SKETCH OF BEST HYPOTHESIS” sheet must be signed by teacher before beginning construction of windmill
5. Bring materials needed to construct the blades of your windmill design.

TEST THE HYPOTHESIS (Design the model and test)
Build the base for your windmill:
1. Use glue to attach the two spools to the foam board. Make sure the spools are parallel before gluing.
2. Poke a hole through the middle of the foam board to allow the string to pass through.
3. Pass a dowel rod through the center of the spools. The dowel should rotate freely.
4. Attach one end of the string securely to the dowel between the two spools.
5. Place your windmill base between two lab tables or in any area that will allow the string to hang freely.
6. Attach the windmill blades that your team has constructed to the base. You may want to vary the number and size of the blades on your windmill.
7. Attach the cup to the end of the string. Fill the cup with 30 paper clips.
8. When ready, instructor will turn on the blow dryer and measure the time it takes for your windmill to lift the cup.

WHAT WAS THE TIME FOR YOUR WINDMILL TO LIFT THE LOAD?

TRIAL #1 ________________  TRIAL #2 ________________

ANALYSIS AND CONCLUSION

Evaluating Methods
After all designs have been tested, determine which design took the shortest amount of time to complete the task. What elements of the design do you think made it the fastest?

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

Evaluating Models
Describe how you would change your design to make your windmill work better or faster.
Appendix D
Labs and Activities From Within the Map – By Quarters

Earth/Space Science – Second Quarter

SEISMOGRAPH AND SEISMOGRAM

SSS (Number and Benchmark):
SC.912.E.6.3
SC.912.P.10.20

Materials Needed:
See Below

Safety Concerns/Issues:
Must have a signed safety contract on file

Procedures
See below

Assessment of Student Learning:
Grade on the finished lab; participation in lab

Teacher Reflection:
The results are not as defined between the different media as one would hope. But it still gives the students the idea that seismic waves travel through different media in the earth.

Created by: Tavares High School Science Dept Date: 2009

INTRODUCTION:
Vibrations in the ground can be detected and recorded by using an instrument called a seismograph. One type of seismograph records motion by tracing wave-shaped lines on paper. Other types translate the motion into electronic signals that can be recoded on magnetic tape or can be sent directly to a computer to be analyzed. The tracing of earthquake motions that are recorded by a seismograph is called a seismogram. In this lab we will make a seismograph, and then use it to record vibrations on a paper seismogram.

You will be creating seismograms by recording the magnitude of earthquakes occurring in three different media: sand, newspaper and water. The container filled with various materials will represent different areas of Earth. A small bottle of water dropped onto the container will represent earthquakes. A large earthquake will happen when the water is dropped from a high level, a smaller earthquake will happen when the bottle of water is dropped from a lower level. The pen will record the magnitude of the two quakes (one big, one small) for each medium.

MATERIALS:
plastic container with lid
meter stick
marker pen
legal pad
small bottle of water
sand
crumpled sheets of newspaper
two sandwich size zip lock bags filled with water
Appendix D
Labs and Activities From Within the Map – By Quarters

PROCEDURE:
1. Fill the container with sand, snap on the lid, and turn the container upside-down
2. Using duct tape, tape the pen to the bottom of the container with half the pen hanging over the edge.
3. Measure a height above the container no higher than 5 cm.
4. Place the yellow legal pad against the pen.
5. Hold the water bottle at the measured height and drop it onto the container, avoiding the marker.
6. Move the pad along while dropping the bottle of water several times in the center of your container’s lid.
7. Label the line with the height from which the bottle was dropped in centimeters
8. Repeat the drop from a higher height (no higher than 10 cm) to create another line on the same sheet of paper. Tip: The bottles will bounce. Make sure to catch them after each drop so they do not disturb the marker and pad.
9. Label the second line with the height from which the bottle was dropped.
10. Label the sheet of paper with the material that was inside the container.
11. Remove the lid from the container and empty the sand into the plastic bucket. Fill the container with crumpled newspaper and replace the lid.
12. Using a new sheet of yellow paper, repeat steps 3-10 above.
13. Remove the newspaper from your container. Put a water-filled zip-lock bag into the container. Make sure the zip-lock is completely sealed and replace the lid.
14. Repeat steps 3-10 above.
15. Return the water-filled zip-lock bag. Dispose of all the newspaper in the trash. Return all materials. Clean up any spills of sand and/or water.
16. Each member of the team will take one of the paper seismograms and turn it in with their completed lab. Be sure to put all three team members name on EACH seismogram.

EARTHQUAKE LAB QUESTIONS

1. What do the sand, the newspaper and the water represent?
   Sand:
   Newspaper:
   Water:

2. Which material vibrated more when the water bottle was dropped on it? Explain why one material might vibrate more than the other.

3. What conditions caused the greatest vibrations?

4. How might the distance of the focus of an earthquake from a seismograph station affect the reading of a seismograph?
Appendix D
Labs and Activities From Within the Map – By Quarters

Earth/Space Science – Second Quarter

GEOLOGIC TIME SCALE

SSS (Number and Benchmark):
SC.912.L.15.1

Materials Needed:
See Below

Safety Concerns/Issues:
Must have a signed safety contract on file

Procedures
See below

Assessment of Student Learning:
Grade on the finished lab; participation in lab
Suggested Rubric below

<table>
<thead>
<tr>
<th>TEAM #</th>
<th>APP EAL (10)</th>
<th>COMPLETION G(8) P(16)</th>
<th>ACCUR RY (10)</th>
<th>PICTUR ES (10)</th>
<th>SEGME NTS (5)</th>
<th>1ST PLA CE (+3)</th>
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</table>

Teacher Reflection:
This is a very large project and students need guidance when setting up the timeline, but the end result is quite impressive

Created by: Tavares High School Science Dept
Date: 2009

INTRODUCTION
Earth’s past has been recorded in the rock record for us to decipher and study. Fossils have given us clues to the order of flora and fauna on Earth. Scientists have developed the geologic time scale from the fossils and formations they have found in the rock record. The geologic time scale outlines Earth’s past events, including major changes in geology.
Appendix D
Labs and Activities From Within the Map – By Quarters

climate, and types of organisms. This “old” information has helped scientists in the present predict ways that Earth might change in the future.

OBJECTIVES
Model the timeline of the events from the formation of Earth to the present
Demonstrate the time span between events

MATERIALS
• 3 meter strip of paper
• 30 cm measuring stick
• meter stick
• colored pencils or markers
• scissors
• glue or tape

• lists of time segments
• list of events
• textbook Chapter 9
• Geologic Time Scale from Internet
• pictures of species living during different time intervals

PROCEDURE
1. Scale: 1 cm = 2 million years
2. Unroll the paper. Using the above scale and letting the right end of the paper represent the present day, label the years on the paper as shown in the diagram below.

3. Cut out each of the time segments: Eons, Eras, Periods and Epochs.
4. Using your textbook and the Geological Time Scale provided as guides, attach the time segments in the appropriate places on your time line
5. Cut out each of the events (blue sheet) and attach them in the correct time interval.
6. Find (or draw) pictures of different species that lived during different times and attach them to the correct time intervals
7. Decorate your time line

ANALYSIS
1. How old is Earth? __________________________
2. Geologic time is divided into how many eons? __________
3. What eons are included in Precambrian time?

4. During which period did Pangaea come together? __________________________
5. When did dinosaurs first appear? __________________________
6. When did the dinosaurs become extinct? __________________________
7. One hypothesis that explains why dinosaurs became extinct is the impact hypothesis. Explain impact hypothesis:
   _______________________________________________________________________
   _______________________________________________________________________
   __________________________
8. What period is the Age of Fishes? __________________________
9. What era is the Age of Mammals? __________________________
Appendix D
Labs and Activities From Within the Map – By Quarters

10. What era is the Age of Reptiles? __________________________
11. Nearly half of Earth’s valuable mineral deposits are found in rocks from which time segment? ______________________
12. When did humans appear? _________________________________
13. What is the length of the time line (in centimeters) from when humans appeared and present day? _____
14. What percent of the geologic time scale does Precambrian time represent? ____________________________
15. What percent of the geologic time scale does the Paleozoic, Mesozoic and Cenozoic Eras combined represent? ____________________________
Appendix D
Labs and Activities From Within the Map – By Quarters

Earth/Space Science– Second Quarter

DIFFERENTIAL WEATHERING

SSS (Number and Benchmark):
SC.912.E.6.2
SC.912.E.6.4

Materials Needed:
See below

Safety Concerns/Issues:
Must have a signed safety contract on file

Procedures
See below

Assessment of Student Learning:
Grade on the finished lab; participation in lab

Teacher Reflection:
This lab needs several days of drying, but the results are usually pretty good. The “caverns” can be seen in the finished product.

INTRODUCTION:
The composition of rock greatly affects the rate at which rock weathers. The process by which softer, less weather-resistant rock wears away and leaves harder, more resistant rock behind is called differential weathering. Sedimentary rocks that contain calcite are weathered most rapidly because they commonly undergo carbonation. Sandstone and other rocks that are strongly cemented together by silicates resist weathering. Some of our most beautiful rock formations and caves were formed by differential weathering.

You will create a “cavern” in a plastic cup by having some of the material “weather” more quickly than other materials. This lab will begin during one period (PART I), be allowed to dry for several days, then be finished another day (PART II).

MATERIALS:
PART I
Clear plastic cup  sand  sugar cubes  wood glue
Granulated sugar  ruler  masking tape

PART II

Created by:  Tavares High School Science Department  Date:  2009

Revised 6/2011
Appendix D
Labs and Activities From Within the Map – By Quarters

Cup of warm water  paper plate  push pin

PROCEDURE:
PART I
1. Write team members’ names on masking tape and place it on the bottom of a clear plastic cup.
2. Pour one inch of sand in the bottom of the cup.
3. Place four sugar cubes on top of the sand, away from the sides of the cup, leaving an empty space in the center.
4. Spoon granulated sugar between the cubes and the insides of the cup. Do not put sugar between the cubes.
5. Cover the cubes with a thin layer of wood glue. The glue should go down between the cubes. See example.
6. Place the cup on the counter and allow to dry.

PART II
7. Complete lab when the glue is completely dry.
8. Using a push pin, poke several small holes in the bottom of the cup.
9. Place the cup in a paper plate and SLOWLY pour warm water into the cup.
10. Allow the water to flow into the dish. Continue to add warm water until most of the sugar has dissolved.
11. Observe what is left in the cup.

DIFFERENTIAL WEATHERING LAB QUESTIONS

1. What do the sand, glue, sugar cubes and water represent?
   Sand:
   Glue:
   Sugar and sugar cubes:
   Water:

2. Which material, in your lab, “weathered” more quickly?

3. Which materials in the Earth weather more quickly?

4. Which materials in the Earth weather more slowly?

5. What kind of weathering does this lab show?

6. Look on line, at the library, or in your textbook to find one example where differential weathering has led to a land formation.
Appendix D
Labs and Activities From Within the Map – By Quarters

Earth/Space Science – Fourth Quarter

Title of Lesson:

IT’S A LONG WAY TO PLUTO

SSS (Number and Benchmark):
SC.912.E.5.11
SC.912.E.5.6

Materials Needed:
See below

Safety Concerns/Issues:
Must have a signed safety contract on file

Procedures
See below

Assessment of Student Learning:
Grade on the finished lab; participation in lab

Teacher Reflection:
This lab was created on the wall of the classroom. The number of sections of Earth/Space science the teacher has will determine where the models can be created.

Created by: Tavares High School Science Dept Date: 2009

INTRODUCTION:
Astronomers use astronomical units or light years to measure large distances in space. In this lab you will use astronomical units (AU) to compare distances between the planets of our solar system. One AU is the distance from Earth to the sun. The distance from Earth to the sun is approximately 150,000,000 kilometers, so one AU is 150,000,000 km. In this exercise, you will use AUs to accurately place the orbital positions of the planets in a scale model and use your model to answer questions.

OBJECTIVES
Convert and apply data to create a model of the solar system and relative orbital positions of the planets.
Create an accurate scale representation of the solar system.

MATERIALS
“planet making” materials calculator meterstick tape

PROCEDURE
1. Use the astronomical unit data from Table 1 as a guide to building your model of the solar system. The data shows the distance of each planet in the solar system from the sun.
## Appendix D
Labs and Activities From Within the Map – By Quarters

### TABLE 1: ASTRONOMICAL UNIT DATA

<table>
<thead>
<tr>
<th>Planet</th>
<th>Distance from the Sun (AU)</th>
<th>Converted to # of centimeters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>0.39</td>
<td></td>
</tr>
<tr>
<td>Venus</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>Earth</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Mars</td>
<td>1.52</td>
<td></td>
</tr>
<tr>
<td>Jupiter</td>
<td>5.20</td>
<td></td>
</tr>
<tr>
<td>Saturn</td>
<td>9.54</td>
<td></td>
</tr>
<tr>
<td>Uranus</td>
<td>19.19</td>
<td></td>
</tr>
<tr>
<td>Neptune</td>
<td>30.06</td>
<td></td>
</tr>
<tr>
<td>Pluto</td>
<td>39.53</td>
<td></td>
</tr>
</tbody>
</table>

2. The scale on this model will be 1 AU = 5 cm. Fill in the table to show how many centimeters each planet will be from the center (sun.)

3. Each team will be assigned a planet and determine where on the “solar system” wall their planet will be located.

4. The team will place a piece of tape on the wall at that spot and label the tape with their planet’s name.

5. Each team will then “create” their planet from what ever material they would like, as long as it will fasten to the wall without damaging the wall. In other words, it needs to be VERY LIGHT WEIGHT. Suggestions: Styrofoam balls cut in half; half circle of crushed paper covered and painted; be creative

6. Teams will then fasten their planet to the proper spot.

7. Each team will ALSO write a short paper stating information about their planet. The paper must be TYPED; no more than ONE page long; and use 12 point font. One paper will represent the team.

8. Teams will fill out the portion of the table below that corresponds to their planet.
APPENDIX D
Labs and Activities From Within the Map – By Quarters

Pluto

ANALYSIS AND CONCLUSION
1. Explain Why do astronomers use the astronomical unit when describing distances within the solar system rather than kilometers?
___________________________________________________________________________________
___________________________________________________________________________________

2. Making Inferences Would the light-year measurement (the distance light travels in a year) be useful in a model of the solar system? Explain
___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________

3. Making Comparisons The Kuiper Belt objects are located between 30 and 100 AUs from the sun. How much more wall space would you need to add to one side of your model to include the entire Kuiper Belt?
___________________________________________________________________________________

4. Applying Ideas The asteroid belt is located between 2.1 and 3.3 AUs from the sun. Where would it be located on our wall model?
___________________________________________________________________________________