



# Washington Township School District



*The mission of the Washington Township Public Schools is to provide a safe, positive, and progressive educational environment that provides opportunity for all students to attain the knowledge and skills specified in the NJ Learning Standards at all grade levels, so as to ensure their full participation in an ever-changing world as responsible, self-directed and civic-minded citizens.*

<b>Course Title:</b>	<b>Integrated I Science</b>				
<b>Grade Level(s):</b>	<b>9<sup>th</sup> Grade</b>				
<b>Duration:</b>	<i>Full Year:</i>	<b>x</b>	<i>Semester:</i>		<i>Marking Period:</i>
<b>Course Description:</b>	<p>This Course is an introductory hands-on science course designed to prepare the student to meet science credit requirements for high school graduation and/or entrance into future college preparatory level science courses. This course will apply scientific concepts to everyday life. The major units of study include: energy, renewable and nonrenewable resources, electricity, nuclear energy, energy alternatives, water quality and quantity, atmosphere and space. Students will work with investigations and labs and be expected to practice writing in the content area through notebook and event journals. Participation in classroom activities, homework assignments, projects, skill demonstration, lab analysis and group assignments. Development of life skills and critical thinking skills will occur through successful completion of the course. This course does not meet the college requirement of a laboratory based science.</p>				
<b>Grading Procedures:</b>	Tests: tests and projects		30%		
	Quizzes		20%		
	Assignments: classwork, homework		20%		
	Proficiency Assessment: preparation, participation, behavior		15%		
	Performance Assessment: labs, journal, logs		15%		
	Midterm and Final count as 20% of year grade.				
<b>Primary Resources:</b>	Global Science : Earth / Environmental Systems Eighth Edition Holt : Physical Science with Earth, Space Science Next Generation Science Standards New Jersey Learning Standards				

## Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21<sup>st</sup> century skills for College and Career Readiness in a global society

<b>Designed by:</b>	Robert Heinze
<b>Under the Direction of:</b>	Dr. Patricia Hughes

**Written:** \_\_\_\_\_ Summer 2017 \_\_\_\_\_.

**Revised:** \_\_\_\_\_.

**BOE Approval:** \_\_\_\_\_.

**Unit Title: Chapter 1 : The Nature of Science**

**Unit Description:** *Students will be Introduced to Global Science. They will build an understanding of the purpose, methods, and effectiveness of science. Students will build a foundation for the class and the future content material. Students will work on further building skills of measurement, graphing, numeric conversion, precision and lab safety.*

**Unit Duration: 17 days (approximately 3 weeks)****Desired Results****Standard(s): HS-ESS3-1****Indicators: ESS3.A****Understandings:***Students will:*

- Define science based on knowledge and experiences
- Develop a scientific process
- Design an experiment in an attempt to answer a scientific question
- Model a process by manipulating lab materials
- Realize that society depends on quality and quantity of accurate and precise data
- Calculate quantities by working in both US and metric systems
- Recognize that graphing is a useful tool
- Understand the importance of lab safety

**Essential Questions:**

- What is science?
- How does the scientific process work?
- How are experiments created?
- What is the importance of a model?
- What is the difference between quantity and quality?
- What is the difference between precision and accuracy?
- How does conversion work for metric and US systems?
- What is the importance of using graphs?
- Why is lab safety important?

**Assessment Evidence****Performance Tasks:**

- Converting metrics and US values
- Graphing
- Following directions
- Text activities 1.1 – 1.3,1.6
- Penny Water Drop Lab
- Measurement Lab
- Density of mystery objects Lab

**Other Evidence:**

- Quiz Chapter 1
- Chapter 1 Test
- Homework

\*Additional or alternative performance assessments may be used.

**Benchmarks:****Density of Mystery Objects Lab****Test Chapter 1**

## Learning Plan

**Learning Activities:** (Lessons, handouts, special focus and STEM activities are found in the online textbook)

<u>Day</u>	<u>Activities</u>
1,2	Class rules, seating chart, grading, mission statement and curriculum
3	Summer assignment Key terms p2
4	Microsoft OneNote set-up On-line textbook set-up
5	Review: Metrics conversion review and units (use special focus p 20-23) Metric worksheet and special focus questions
6	Review: Converting between systems and units Dimensional analysis worksheet and special focus questions
7	Logs Sheets begin Review: Scientific Notation review Scientific Notation worksheet Review: The importance of Graphing: review graph types Graphing worksheet
8	Lesson: 1.1 Science as a way of thinking – notes Activity 1.1 What do you think science is? - discussion Lesson: 1.2 What scientists do -notes Activity 1.2 Asking scientific questions - Lab
9	Lesson: 1.3 Scientific problem solving – notes Activity 1.3 Modeling the weathering process -Lab Quiz preparation
10	Quiz Chapter 1 Lesson: 1.5 Thinking in a scientific manner - notes Activity 1.6 Scientific habits of mind, Dihydrogen Monoxide-The Unrecognized Killer (q 1-4)
11	Lesson: 1.6 Scientific tools and skills Activity 1.7 Quality and quantity of data – discussion Lesson: 1.7 Challenges to taking measurements – notes Lesson: 1.9 Accurate Data, Precise Data – notes Questions and Tasks p19 #1-2 Penny Water Drop Lab – groups of 3-4
12	Lab Safety and contract – notes Lesson: 1.10 Using the results of Science- discussion
13	Measurement Lab – groups of two
14	Lab safety quiz Study guide
15	Density of Mystery Objects Lab
16	Test preparation
17	Test Chapter 1 Define Key Terms p 76

## Unit Learning Goal and Scale

*(Level 2.0 reflects a minimal level of proficiency)*

**Standard:** HS-ESS3-1 Construct an explanation on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

**DCI:** ESS3.A Resource availability has guided the development of human society.

<b>4.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li> <li>• Help other students in mastering the material</li> </ul>
<b>3.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Explain that science is based on knowledge and experience and that it is a planned process</li> <li>• Understand that human society depends on quality and quantity of accurate and precise data</li> <li>• Complete all of level 2.0 studies and performance</li> </ul>
<b>2.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Describe , define and recall the scientific method</li> <li>• Convert numbers from one metric unit to another</li> <li>• Understand the importance of lab safety and recall lab safety rules.</li> <li>• Understand the reason for graphing data</li> </ul>
<b>1.0</b>	With help, partial success at level 2.0 content and level 3.0 content.
<b>0.0</b>	Even with help, no success.

## Unit Modifications for Special Population Students

<b>Advanced Learners</b>	<p>Enrichment worksheets Assist struggling learners</p>
<b>Struggling Learners</b>	<p>Use differentiated instruction activities Pair with an advanced learner <a href="http://www.nj.gov/education/udl/">http://www.nj.gov/education/udl/</a></p>
<b>English Language Learners</b>	<p>Use ELL support activities as per ELL level <a href="http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf">http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf</a></p>
<b>Special Needs Learners</b>	<p>Follow IEP modifications Work with ICS Teacher to make material more achievable <a href="http://www.nj.gov/education/udl/">http://www.nj.gov/education/udl/</a></p>

## Interdisciplinary Connections

**Indicators:**

Mathematics – calculations, formulas, conversion from unit to unit, graphing, metrics, scientific notation

English – writing skills, reading skills, taking notes

Social Studies – current event

## Integration of 21<sup>st</sup> Century Skills

**Indicators:**

Use of student computers for textbook, activities, handouts, current events, special focus, note taking, research

Lab activities and textbook activities that focus on STEM models of learning

Lab activities using lab technology and lab computer interfaces for precise measurements

**Unit Title: Chapter 3 : Energy Flow and Matter Cycles**

**Unit Description:** *Students will build an understanding of the relationships among energy flow, the cycling of matter, and human use of energy and mineral resources. Energy forms and conversion of energy will also be studied. The law of conservation of energy and matter will be analyzed as well as the first and second law of thermodynamics.*

**Unit Duration: 13 days (approximately 3 weeks)****Desired Results****Standard(s): HS-PS3-2****Indicators: PS3.A****Understandings:***Students will:*

- Define energy, mass and matter
- Classify examples of energy into a potential energy or a kinetic energy category
- Measure and calculate changes of an object's acceleration in terms of potential and kinetic energy
- Compare a closed system, and open system and a steady state system
- State, describe and give examples for the conservation of mass and the conservation of energy
- List the six forms of energy
- Realize that matter on Earth is in a closed system and energy from the sun is in an open system
- Analyze the transformation of energy types and sources
- State the second law of thermodynamics and explain why there is always loss of energy.
- Examine the definition of efficiency and compare efficiencies of different energies
- Define energy quality and realize that we face a quality crisis not an energy crisis

**Essential Questions:**

- What is the universe made of?
- What is energy and matter?
- How is potential energy different from kinetic energy?
- What is the difference between closed, open and steady state systems?
- What are the six types of energy?
- What are the major sources of energy?
- How can energy be transformed from one type to another?
- What is the second law of thermodynamics?
- How do you calculate and rate efficiencies of different energies?
- What is the first law of thermodynamics?
- What is the difference between an energy crisis and an energy quality crisis?
- Why is generated heat a poor source of energy?
- What is system efficiency?

**Assessment Evidence****Performance Tasks:**

- Kinetic and Potential Energy Lab
- Heat Efficiency Lab
- Text activities 3.5, 3.7, 3.8

**Other Evidence:**

- Quiz Chapter 3
- Current Event Journal Entry #1
- Chapter 3 Test

\*Additional or alternative performance assessments may be used.

**Benchmarks:****Test Chapter 3**

## Learning Plan

**Learning Activities:** (Lessons, handouts, special focus and STEM activities are found in the online textbook)

### Day   Activities

- 1     Current event entry #1
- 2     Lesson: Energy and Matter – The Big Picture - notes  
Lesson: 3.1 Energy flow in nature and human built systems - notes  
Discuss Figure 3.6  
Lesson: 3.2 So what are matter and energy? - notes  
Questions and Tasks #1-2 p84
- 3     Lesson: 3.3: Kinetic and potential energy -notes  
Research URL: <https://nj.pbslearningmedia.org-Roller Coaster>  
Download Vernier probe software for Labs <https://www.vernier.com/downloads/>  
Lesson: 3.4 Closed and open systems - notes  
Questions and Tasks p88 #1-3
- 4     Kinetic and Potential Energy Lab  
Video <https://www.youtube.com/watch?v=H3UQiuDej38> “Roller Coaster Physics”
- 5     Lesson: 3.5 Conservation laws - notes  
Balancing chemical equations examples and worksheet  
Questions and Tasks p89 #1-8
- 6     Read figure 3.12 p92  
Lesson: 3.6 The six forms of energy – notes  
Lesson 3.7 Energy Sources – notes  
Activity 3.5 procedures #1-3 only and Questions and Tasks top of p99 #1-2 groups
- 7     Lesson: 3.8 Energy units and conversion factors – notes  
Activity 3.7 Conversion factors p103  
Quiz preparation -review worksheet
- 8     Lesson: 3.9 Three forms of the second law of thermodynamics -notes  
Read Special Focus – Kinetic Theory of Matter  
Activity 3.8 Examining the second law p106 Task 1 only questions 1 and 2 -partners
- 9     Quiz Chapter 3  
Lesson: 3.10 Energy and Efficiency - notes  
Heat Efficiency Lab (Vernier temp probe)
- 10    Questions and Tasks p112 #1-5 only  
Lesson: 3.11 System efficiency - notes Thinking in a scientific manner – notes  
Questions and Tasks p115  
Lesson: 3.12 Net energy – notes  
Key question and discussion – What is it? (Is it worth it?)
- 11    Lesson: 3.13 The concept of energy quality - notes  
Lesson 3.14 Another energy unit - notes  
Lesson 3.15 Strategies for resource users – notes  
Questions and Tasks p122
- 12    Study guide  
Crossword Puzzle worksheet  
Summary p122-123
- 13    Test Chapter 3  
Select Key Terms p 304

## Unit Learning Goal and Scale

(Level 2.0 reflects a minimal level of proficiency)

**Standard:** HS-PS3-2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).

**DCI:** PS3.A Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.

4.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li> <li>Help other students in mastering the material</li> </ul>
3.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>Measure and calculate changes of an object's acceleration in terms of potential and kinetic energy</li> <li>State, describe and give examples for the conservation of mass and the conservation of energy</li> <li>Analyze the transformation of energy types and sources</li> <li>State the second law of thermodynamics and explain why there is always loss of energy</li> <li>Examine the definition of efficiency and compare efficiencies of different energies</li> <li>Define energy quality and realize that we face a quality crisis not an energy crisis</li> </ul>
2.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>Define mass, energy, matter</li> <li>List the six forms of energy</li> <li>Give an example of a transfer of energy from one type to another</li> <li>Define the second law of thermodynamics</li> </ul>
1.0	With help, partial success at level 2.0 content and level 3.0 content.
0.0	Even with help, no success.

### Unit Modifications for Special Population Students

<b>Advanced Learners</b>	<p>Enrichment worksheets Assist struggling learners</p>
<b>Struggling Learners</b>	<p>Use differentiated instruction activities Pair with an advanced learner <a href="http://www.nj.gov/education/udl/">http://www.nj.gov/education/udl/</a></p>
<b>English Language Learners</b>	<p>Use ELL support activities as per ELL level <a href="http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf">http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf</a></p>
<b>Special Needs Learners</b>	<p>Follow IEP modifications Work with ICS Teacher to make material more achievable <a href="http://www.nj.gov/education/udl/">http://www.nj.gov/education/udl/</a></p>

### Interdisciplinary Connections

**Indicators:**

Mathematics – calculations, formulas, conversion from unit to unit, graphing, metrics, scientific notation

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Social Studies – current event

## Integration of 21<sup>st</sup> Century Skills

**Indicators:**

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Lab activities using lab technology and lab computer interfaces for precise measurements



**Unit Title: Chapter 8 : Energy Today**

**Unit Description:** *Students will increase their understanding of the energy sources currently relied on by modern societies. Heat energy will be studied in terms of calories. Fossil fuels and its forms of energy will be analyzed. Electrical energy and how it can be created will be studied. Electrical circuits both parallel and series will be examined and compared. Thermal pollution will be discussed.*

**Unit Duration: 19 days (approximately 4 weeks)**

### Desired Results

**Standard(s): HS-PS2-5, HS-ESS3-2**

**Indicators: PS3.A, ESS3.A**

**Understandings:**

*Students will:*

- Classify the three major energy consuming sectors of our economy
- Analyze historical energy use
- State two reasons that early Americans changed from wood to coal
- Calculate the energy content of fossil fuels
- Realize the US and North America consume a large portion of the energy in the world and that energy consumption is growing around the world
- State how oil deposits and coal originated
- Name the layers of sediment in which petroleum is found
- List five common product made from petroleum
- Explain what hydraulic fracturing is and how it is revolutionizing oil and gas production
- Name a major use for each of the four types of coal
- Understand how an electrical generator works
- Examine the different types of generating electricity
- Explain the difference between parallel and series circuits and how they relate to their home and school
- Build a parallel and series circuit
- Define thermal pollution, relate it to electrical generation

**Essential Questions:**

- Where do we get our energy from?
- What are the three major energy consumers?
- How has the use of energy changed historically?
- Why did we switch from burning wood to burning coal?
- Which fossil fuel has the most energy?
- What are the major sources of energy?
- What is fracking?
- What is the best type of coal and what are the stages it goes through to get there?
- How is electricity generated?
- What is thermal pollution?
- What is an electrical circuit?
- How does current flow?
- What is Ohm's law?
- How much voltage is there in your house?
- Why is electrical safety important?
- What is a fuse or circuit breaker?
- What are the differences between series and parallel circuits?

### Assessment Evidence

**Performance Tasks:**

- Series and Parallel Circuits Lab
- Text activities 8.1, 8.2, 8.4, 8.6
- Essay – Compare and contrast series and parallel circuits

**Other Evidence:**

- Quiz Chapter 8
- Open Notes Quiz on Electric circuits
- Current Event Journal #2
- Chapter 8 Test
- Log Check

\*Additional or alternative performance assessments may be used.

**Benchmarks:**

**Essay – Compare and Contrast Series and Parallel Circuits**

**Test Chapter 8**

## Learning Plan

**Learning Activities:** (Lessons, handouts, special focus and STEM activities are found in the online textbook)

### Day   Activities

- 1     Activity 8.1 Where do we get our energy p306 -partners  
      Lesson: 8.1 How we use energy -notes  
      Activity 8.2 An energy history of the United States p308- partners
- 2     Lesson: 8.2 Historical energy use – notes  
      Copy figure 8.8 Energy content of fuels in calories into notes p 311  
      Notes 8.3 America’s energy transitions  
      Activity 8.4 Unquenchable energy thirst p313
- 3     Fossil Fuels  
      Lesson: 8.4 Fossil Fuels- Oil -notes  
      Lesson: 8.5 Fossil Fuels- Gas -notes  
      Discussion Oil or Gas
- 4     Video [https://www.youtube.com/watch?v=Wd3\\_B4LqvOw](https://www.youtube.com/watch?v=Wd3_B4LqvOw) “Coal the Documentary”  
      Bill Nye Fossil Fuels (6min) on one drive
- 5     Lesson: 8.6 Hydraulic fracturing “Fracking” A new technology - notes  
      Examine figures 8.19 and 8.20 p322
- 6     Activity 8.6 Coal p323  
      Read Lesson: 8.7 Coal { take notes (part of Activity 8.6)}  
      Questions and Tasks p331 #1-10
- 7     Video “Blink – Energy Gone” DVD
- 8     Electrical Energy  
      Lesson: 8.8 Hydropower – notes  
      Examine figures 8.33-8.36  
      Demonstrate hand crank generator and motor  
      Quiz preparation – review sheet
- 9     Lesson: 8.9 Electric power generation -notes  
      Read Special Focus – Kinetic Theory of Matter  
      Video Electric 1 on One Drive
- 10    Quiz Chapter 8  
      Log Check – 1<sup>st</sup> marking period  
      Current event entry #2 on electricity
- 11    Lesson: 8.10 Thermal pollution - notes  
      Video Electric 2 on One Drive
- 12    Complete video Electric 2  
      Video Electric 3 on One Drive
- 13    Electric Circuits  
      Notes 17-3 (Physical Science Text)  
      Concept review 17-3 worksheet  
      Circuit diagrams -notes  
      Schematic symbols -notes
- 14    Check Concept Review 17-3 worksheet (Physical Science Text)  
      Series Circuit worksheet  
      Parallel Circuit worksheet  
      Electrical safety - notes  
      Section Review 17-3 worksheet (Physical Science Text)

**Learning Activities Continued:**

- 15 Check Section Review 17-3 worksheet (Physical Science Text)  
Series and Parallel Circuits Lab
- 16 Prewrite and create essay – Compare and Contrast Series and Parallel Circuits (rubric)
- 17 Open notes quiz on Electric Circuits  
Video - Bill Nye Electricity on One Drive
- 18 Study guide  
Summary p 343  
Word search worksheet
- 19 Test Chapter 8  
Select Key Terms p 346

**Unit Learning Goal and Scale***(Level 2.0 reflects a minimal level of proficiency)*

**Standard: HS-PS2-5 Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.**

**DCI: PS3.A Definitions of Energy – “Electric energy” may mean energy stored in a battery or energy transmitted by electric currents.**

4.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li> <li>Help other students in mastering the material</li> </ul>
3.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>Compare and contrast series and parallel circuits</li> <li>Build a series and a parallel circuit</li> <li>List multiple ways to generate electricity</li> </ul>
2.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>Define series and parallel circuits</li> <li>Explain how a basic generator creates electricity</li> <li>Discuss in terms of series and parallel, how their house and school is wired</li> </ul>
1.0	With help, partial success at level 2.0 content and level 3.0 content.
0.0	Even with help, no success.

**Standard: HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.**

**DCI: ESS3.A Natural resources – All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors.**

4.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li> <li>Help other students in mastering the material</li> </ul>
3.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>Give a brief description of historical energy use</li> <li>Calculate the energy content of fossil fuels</li> <li>Name each of the four types of coal</li> <li>Give an example of use for each type of coal</li> <li>Define hydraulic fracturing and explain its importance</li> <li>List the three major energy consuming areas</li> </ul>

2.0	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• State reasons for a change from wood to coal</li> <li>• Explain how oil and coal originated</li> <li>• Realize that energy consumption is increasing</li> <li>• List five common products made from petroleum</li> </ul>
1.0	With help, partial success at level 2.0 content and level 3.0 content.
0.0	Even with help, no success.

### Unit Modifications for Special Population Students

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<b>Struggling Learners</b>	Use differentiated instruction activities Pair with an advanced learner <a href="http://www.nj.gov/education/ud/">http://www.nj.gov/education/ud/</a>
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### Interdisciplinary Connections

**Indicators:**

Mathematics – calculations, formulas, conversion from unit to unit, graphing, metrics, scientific notation  
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Social Studies – current event

### Integration of 21<sup>st</sup> Century Skills

**Indicators:**

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Lab activities and textbook activities that focus on STEM models of learning  
Lab activities using lab technology and lab computer interfaces for precise measurements

<b>Unit Title: Chapter 9 : Nonrenewable Resource Depletion</b>	
<b>Unit Description:</b> <i>Students will examine the depletions pattern for non-renewable resources and will analyze how resource lifetimes are determined. These studies will focus on fossil fuels. Students will analyze both resources and reserves.</i>	
<b>Unit Duration: 8 days (approximately 2 weeks)</b>	
<b>Desired Results</b>	
Standard(s): HS-ESS3-1, HS-ESS3-3	
Indicators: ESS3.A, ESS3.C	
<p><b>Understandings:</b>  <i>Students will:</i></p> <ul style="list-style-type: none"> <li>Analyze M. King Hubbert graph of petroleum production</li> <li>Explain why the physical process of looking for more crude oil will probably not be sufficient for the future</li> <li>Explain how a lack or excess of domestic supplies of fuel can be compensated for by importing or exporting supplies</li> <li>Distinguish between resources and reserves</li> <li>Realize the quantity of energy available from the remaining US. Reserves of non-renewable energy</li> <li>Compare the reserves to the estimated requirements for the next 20 years</li> <li>Understand why the US is not pursuing nuclear energy</li> </ul>	<p><b>Essential Questions:</b></p> <ul style="list-style-type: none"> <li>What is the M. King Hubbert graph?</li> <li>What is the importance of the Hubbert graph?</li> <li>Why is it getting more difficult to find oil?</li> <li>Why do we import and export oil?</li> <li>What is the difference between reserves and resources?</li> <li>How much energy reserves exist?</li> <li>Will we have enough reserves for the next 20 years?</li> <li>Why don't we use more nuclear energy?</li> </ul>
<b>Assessment Evidence</b>	
<p><b>Performance Tasks:</b></p> <ul style="list-style-type: none"> <li>Text activities 9.4</li> </ul>	<p><b>Other Evidence:</b></p> <ul style="list-style-type: none"> <li>Chapter 9 Test</li> </ul> <p>*Additional or alternative performance assessments may be used.</p>
<p><b>Benchmarks:</b></p> <p>Test Chapter 9</p>	

## Learning Plan

**Learning Activities:** (Lessons, handouts, special focus and STEM activities are found in the online textbook)

Day   Activities

- |   |   |
|---|---|
| 1 | Video – Dinosaurs on Space Ship: Earth – Where did Fossil Fuels come from? DVD  |
| 2 | Examine Figure 9.4 p 353 Hubbert Resource Graph<br>Lesson: 9.2: Resource depletion curves -notes<br>Lesson: 9.3: Resources and reserves- notes<br>Questions and Tasks p 354 #1,2  |
| 3 | Lesson: 9.4 Estimating the size of resources – notes<br>Lesson: 9.5 Hubbert theory of resource estimation -notes<br><u>How much do we have?</u><br>Lesson: 9.6 Nonrenewable resources -notes<br>Discussion : which fossil fuel is best? Changes from original discussion in Chapter 8 |
| 4 | Activity 9.4 Comparing non-renewable reserves p362 – partners   |
| 5 | Reducing problems related to resource depletion -notes  |
| 6 | Summary<br>Study guide<br>Test preparation  |
| 7 | Key Terms p372  |
| 8 | Test Chapter 9<br>Complete Key terms for Chapter 10   |

### Unit Learning Goal and Scale

*(Level 2.0 reflects a minimal level of proficiency)*

**Standard(s):** HS-ESS3-1 Construct an explanation on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

**DCI:** ESS3.A Resource availability has guided the development of human society.

**HS-ESS3-3** Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

**DCI:** ESS3.C The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.

<b>4.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li> <li>• Help other students in mastering the material</li> </ul>
<b>3.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Define and analyze a Hubbert graph</li> <li>• Compare and contrast reserves and resources</li> <li>• Discuss if we have enough reserves for the next 20 years</li> <li>• Explain why the United States does not use more nuclear energy</li> </ul>
<b>2.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Explain why it is becoming more difficult to find new oil deposits</li> <li>• Discuss why we import and export oil</li> <li>• Define reserves and resources</li> </ul>
<b>1.0</b>	With help, partial success at level 2.0 content and level 3.0 content.
<b>0.0</b>	Even with help, no success.

## Unit Modifications for Special Population Students

<b>Advanced Learners</b>	Enrichment worksheets Assist struggling learners
<b>Struggling Learners</b>	Use differentiated instruction activities Pair with an advanced learner <a href="http://www.nj.gov/education/ud/">http://www.nj.gov/education/ud/</a>
<b>English Language Learners</b>	Use ELL support activities as per ELL level <a href="http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf">http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf</a>
<b>Special Needs Learners</b>	Follow IEP modifications Work with ICS Teacher to make material more achievable <a href="http://www.nj.gov/education/ud/">http://www.nj.gov/education/ud/</a>

## Interdisciplinary Connections

### Indicators:

Mathematics – calculations, formulas, conversion from unit to unit, graphing, metrics, scientific notation

English – writing skills, reading skills, taking notes

Social Studies – current event

## Integration of 21<sup>st</sup> Century Skills

### Indicators:

Use of student computers for textbook, activities, handouts, current events, special focus, note taking, research

Lab activities and textbook activities that focus on STEM models of learning

Lab activities using lab technology and lab computer interfaces for precise measurements

**Unit Title: Chapter 10 : Nuclear Energy**

**Unit Description:** *Students will examine the basic principles of nuclear energy and consider its potential as an energy option. Student will also study the atom in terms of radiation and how it is produced.*

**Unit Duration: 14 days (approximately 3 weeks)****Desired Results****Standard(s):** HS-PS1-1, HS-PS1-8**Indicators:** PS1.A, PS1.C**Understandings:***Students will:*

- Recall the parts of an atom and the charges of each subatomic part
- Understand that subatomic particles can break down and give off pieces
- Define Nuclear radiation
- List and distinguish among modes of radiative decay
- Define half-life
- Realize the problem of radioactive waste disposal
- Recognize some of the current state and the current problems related to the use of nuclear power to include the advantages and disadvantages
- Distinguish between fission and fusion
- State why uranium must be enriched before it can be used
- Realize how radiation affects biological organisms
- Know the units used to measure radiation
- Realize that the breeder option can greatly improve the amount of energy created but there are serious implications involved

**Essential Questions:**

- What are the three subatomic charges called?
- Where are they located in an atom?
- What are their charges?
- What is nuclear radiation?
- What are the differences between the 3 types of radiation?
- How do you calculate and write a nuclear reaction?
- What is the difference between nuclear fission and nuclear fusion?
- What does nuclear radiation do to biological organisms?
- How does a nuclear power plant work?
- Is there a safe way to store nuclear waste?
- Why don't we use more nuclear reactors?
- Are nuclear reactors safe?
- What is the breeder option and is it a good option?

**Assessment Evidence****Performance Tasks:**

- Text activities 10.2, 10.4, 10.7, 10.9
- Research on Chernobyl and Fukushima Daiichi Nuclear plants

**Other Evidence:**

- Quiz Chapter 10
- Current Event Journal #3
- Chapter 10 Test
- Log Check

\*Additional or alternative performance assessments may be used.

**Benchmarks:****Test Chapter 10****Midterm**



## Learning Plan

**Learning Activities:** (Lessons, handouts, special focus and STEM activities are found in the online textbook)

Day   Activities

- 1   Energy from Atoms  
Lesson: 10.1 The atomic model – notes  
Activity 10.2 Working with atomic symbols p380  
Atomic Particles worksheet
- 2   Lesson: 10.2 Radioactivity – notes  
Activity 10.4 Writing nuclear equations p384  
Nuclear equations 1 practice worksheet
- 3   Lesson: 10.3 Sources of nuclear energy – notes  
Lesson: 10.4 Fissionable isotopes -notes  
Lesson: 10.5 Fusion fuels – notes  
Activity 10.7 Nuclear fuel cycle p390
- 4   Lesson: 10.6 The nuclear fuel cycle – a closer look – notes  
Video - <https://www.youtube.com/watch?v=AdA5d8Hm0> "Tour of nuclear power plant"  
Research - Chernobyl and Fukushima Daiichi Nuclear plants - groups
- 5   Complete reports  
Listen and discuss reports  
Lesson: 10.7 Nuclear power plants -notes  
Lesson: 10.8 The pros and cons of nuclear power – notes
- 6   Video - <https://www.youtube.com/watch?v=eDCEjWNGv6Y> "The nuclear Option"
- 7   Complete video  
Discussion of video and pros and cons of Nuclear power  
Lesson 10.9 Biological effects of radiation – notes  
Quiz preparation
- 8   Current event journal #3
- 9   Lesson: 10.10 Measuring radiation: the units - notes  
Lesson: 10.11 Dosage and effect – notes  
Activity 10.9 Calculate your personal radiation dose p407  
Lesson: 10.12 Beneficial uses of radiation - notes
- 10   Quiz Chapter 10  
Lesson: 10.13 The breeder option - notes  
Questions and tasks p412 #1-4
- 11   Lesson: 10.14 A new generation of nuclear power plants - notes  
Lesson: 10.15 The fusion future - notes  
Video – 10.15 <https://www.youtube.com/watch?v=GbzKFGnFWr0> "How will a fusion power plant work?"  
Lesson: 10.16 The future of nuclear power - notes
- 12   Summary  
Study guide  
Test preparation
- 13   Game review  
Key Terms p416
- 14   Test Chapter 10  
Complete Key terms for Chapter 11  
Log Check

## End of Marking Period 2

Midterm review

Midterm

### Unit Learning Goal and Scale

*(Level 2.0 reflects a minimal level of proficiency)*

**Standard(s): HS-PS1-1 Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.**

**DCI: PS1.A Structure and properties of matter – Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons.**

**HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.**

**DCI: PS1.C Nuclear processes – Nuclear processes, including fusion, fission and radioactive decays of unstable nuclei, involve release or absorption of energy. The total number of neutrons plus protons does not change in any nuclear process.**

4.0	Students will be able to: <ul style="list-style-type: none"><li>• In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li><li>• Help other students in mastering the material</li></ul>
3.0	Students will be able to: <ul style="list-style-type: none"><li>• List the types of radioactive decay</li><li>• Discuss the problems related to using nuclear power</li><li>• Differentiate between fission and fusion</li><li>• Explain how a nuclear power plant works</li><li>• Calculate nuclear reactions</li></ul>
2.0	Students will be able to: <ul style="list-style-type: none"><li>• Name the subatomic particles, their charges and location within an atom</li><li>• Realize that atoms decay</li><li>• Define nuclear radiation</li><li>• Discuss how radiation affects living organisms</li></ul>
1.0	With help, partial success at level 2.0 content and level 3.0 content.
0.0	Even with help, no success.

### Unit Modifications for Special Population Students

<b>Advanced Learners</b>	Enrichment worksheets Assist struggling learners
<b>Struggling Learners</b>	Use differentiated instruction activities Pair with an advanced learner <a href="http://www.nj.gov/education/ud/">http://www.nj.gov/education/ud/</a>
<b>English Language Learners</b>	Use ELL support activities as per ELL level <a href="http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf">http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf</a>
<b>Special Needs Learners</b>	Follow IEP modifications Work with ICS Teacher to make material more achievable <a href="http://www.nj.gov/education/ud/">http://www.nj.gov/education/ud/</a>

## Interdisciplinary Connections

**Indicators:**

Mathematics – calculations, formulas, conversion from unit to unit, graphing, metrics, scientific notation

English – writing skills, reading skills, taking notes

Social Studies – current event

## Integration of 21<sup>st</sup> Century Skills

**Indicators:**

Use of student computers for textbook, activities, handouts, current events, special focus, note taking, research

Lab activities and textbook activities that focus on STEM models of learning

Lab activities using lab technology and lab computer interfaces for precise measurements

<b>Unit Title: Chapter 11: Energy Alternatives</b>	
<b>Unit Description:</b> <i>Students will examine the energy sources that can be alternatives to the use of oil, natural gas, coal, and nuclear power. Each student will be teamed with another and selected to research and write a lesson complete with power point, short video and worksheet. They will then teach the class on the material.</i>	
<b>Unit Duration: 16 days (approximately 3 weeks)</b>	
<b>Desired Results</b>	
Standard(s): HS-ESS3-2, HS-ESS3-4	
Indicators: ESS3.A, ESS3.C	
<p><b>Understandings:</b>  <i>Students will:</i></p> <ul style="list-style-type: none"> <li>• Explain how synthetic fuels can be used as alternatives to oil and natural gas</li> <li>• Explain why it may be useful to change coal into a gas or liquid</li> <li>• Understand that oil shale and tar sands can be useful</li> <li>• Analyze geothermic convection currents</li> <li>• State how we get energy from tides and waves</li> <li>• Analyze passive and active solar homes</li> <li>• State what must be done to sunlight for its energy to be use for electricity</li> <li>• Explain how solar power can be concentrated</li> <li>• Analyze solar cells</li> <li>• Explain how wind power plays an important role in creating energy</li> <li>• Discuss how ocean thermal energy can play a major role</li> <li>• Describe how orbiting solar satellites cold transmit energy to the surface</li> <li>• Explain how water power works</li> <li>• Understand that wood, and trash can create energy</li> <li>• Describe what biofuel is and where it comes from</li> </ul>	<p><b>Essential Questions:</b></p> <ul style="list-style-type: none"> <li>• What is a synthetic fuel?</li> <li>• Can we change coal into a gas or a liquid?</li> <li>• How does a convection current work?</li> <li>• How do we get energy from geothermal convection currents?</li> <li>• Can ocean tides and waves provide energy?</li> <li>• Which is better passive or active solar energy?</li> <li>• What is an earth-sheltered home?</li> <li>• What is the importance of concentrated solar power?</li> <li>• How does a solar cell work?</li> <li>• Can we harness energy from the wind?</li> <li>• Why is the ocean's heat be so important?</li> <li>• Can we transmit energy, collected in space, to the surface?</li> <li>• How do hydroelectric plants work?</li> <li>• What is biofuel and why are major companies like Exxon researching this?</li> <li>• What are some sources of biofuel?</li> </ul>
<b>Assessment Evidence</b>	
<p><b>Performance Tasks:</b></p> <ul style="list-style-type: none"> <li>• Research a section of the chapter</li> <li>• Create PowerPoint notes and a worksheet</li> <li>• Find an appropriate video for the topic</li> <li>• Teach the class about the section</li> </ul>	<p><b>Other Evidence:</b></p> <ul style="list-style-type: none"> <li>• Student group created Quiz</li> <li>• Chapter 11 Test</li> </ul> <p>*Additional or alternative performance assessments may be used.</p>
<p><b>Benchmarks:</b></p> <p>Teaching a section</p> <p>Test Chapter 11</p>	

## Learning Plan

**Learning Activities:** (Lessons, handouts, special focus and STEM activities are found in the online textbook)

<u>Day</u>	<u>Activities</u>
1-4	Research topics (11 groups) 1) 11.1 New fuels from coal 11.2 Oil Shale 11.3 Tar sands 2) 11.4 Geothermal energy 3) 11.5 Tidal energy 11.6 Ocean waves 4) 11.7 Passive solar 11.8 Earth sheltered homes 5) 11.9 Active solar 6) 11.10 Concentrating solar power 11.11 Solar photovoltaic energy 7) 11.12 Wind power 8) 11.13 Ocean thermal energy conversion 11.14 Orbiting solar satellite energy 9) 11.15 Water power 10) 11.16 Wood 11.17 Energy from trash 11) 11.18 Bioconversion Take notes Produce PowerPoint and a worksheet
5-10	Teach lesson – each group 20 minutes Discussions
11	Class created review and quiz (2 questions per group)
12	open review quiz Video – Snowmen: The melt and energy (DVD)
13	Complete video Review game
14	Summary Study guide Test preparation
15	Key Terms p458
16	Test Chapter 11 Complete Key terms for Chapter 12

## Unit Learning Goal and Scale

(Level 2.0 reflects a minimal level of proficiency)

**Standard(s):** HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

**DCI: ESS3.A** Natural resources – All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors.

**HS-ESS3-4** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

**DCI: ESS3.C** Human impacts on Earth systems – Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation.

<b>4.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li> <li>• Help other students in mastering the material</li> </ul>
<b>3.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Discuss why it would be better to change coal into a gas or liquid</li> <li>• Analyze energy alternatives determining their individual benefits and limits</li> <li>• Describe biofuel and where its source is from</li> <li>• Determine and discuss whether passive or active solar energy is better</li> </ul>
<b>2.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Define synthetic fuel</li> <li>• Describe and explain how a convection current works</li> <li>• Define oil shale</li> <li>• Name several energy alternatives and give examples</li> </ul>
<b>1.0</b>	With help, partial success at level 2.0 content and level 3.0 content.
<b>0.0</b>	Even with help, no success.

### Unit Modifications for Special Population Students

<b>Advanced Learners</b>	<p>Enrichment worksheets Assist struggling learners</p>
<b>Struggling Learners</b>	<p>Use differentiated instruction activities Pair with an advanced learner <a href="http://www.nj.gov/education/ud/">http://www.nj.gov/education/ud/</a></p>
<b>English Language Learners</b>	<p>Use ELL support activities as per ELL level <a href="http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf">http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf</a></p>
<b>Special Needs Learners</b>	<p>Follow IEP modifications Work with ICS Teacher to make material more achievable <a href="http://www.nj.gov/education/ud/">http://www.nj.gov/education/ud/</a></p>

### Interdisciplinary Connections

**Indicators:**

Mathematics – calculations, formulas, conversion from unit to unit, graphing, metrics, scientific notation

English – writing skills, reading skills, taking notes

Social Studies – current event

## Integration of 21<sup>st</sup> Century Skills

**Indicators:**

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Lab activities and textbook activities that focus on STEM models of learning

Lab activities using lab technology and lab computer interfaces for precise measurements

**Unit Title: Chapter 12: Strategies For Using Energy**

**Unit Description:** *Students will examine strategies for using energy. They will then begin to sort out our options as a basis for future planning. Students will examine the possibilities of how to make their living arrangements more energy efficient. They will also determine how to make a more energy efficient vehicle.*

**Unit Duration: 10 days (approximately 2 weeks)****Desired Results****Standard(s): HS-ESS3-4****Indicators: ESS3.C****Understandings:***Students will:*

- Define the three types of heat transfer
- List strategies for making a home more energy efficient
- Graph the fuel economy vs. curb weight of various automobiles
- Distinguish between nonrenewable and continuous energy sources
- Formulate a possible energy plan for the future

**Essential Questions:**

- What is the difference between radiation, conduction and convection?
- What are some of the things that we can look for in our houses that can make them more energy efficient?
- What is the current standard for insulation?
- What are ways of making a more efficient vehicle?
- How does the weight of a car effect the fuel efficiency?
- Why are appliances energy rated?
- What is a fuel cell?
- What is a continuous energy source?
- Which energy sources are the best?
- Will these best energy sources make a good choice for the future?

**Assessment Evidence****Performance Tasks:**

- Activity 12.1 and 12.2
- Analyze forms of energy and decide which sources are the best decisions for the future

**Other Evidence:**

- Current Event Journal #4
- Chapter 12 Test

\*Additional or alternative performance assessments may be used.

**Benchmarks:****Test Chapter 12**



## Learning Plan

**Learning Activities:** (Lessons, handouts, special focus and STEM activities are found in the online textbook)

Day   Activities

- 1     The First Priority: Conservation  
Special focus: heat transfer - notes  
Conduction, radiation and convection  
Demonstration conduction bi metal strip, ball and ring. multi metal wax melt, convection tube  
Focus questions and tasks p461 #1-5
- 2     Activity 12.1 p461 as guided discussion  
Lesson: 12.1 Well insulated buildings – notes
- 3     Lesson: 12.2 More efficient vehicles – notes  
Special focus The car of the future p469  
Activity 12.2 Fuel efficiency vs weight p 470  
Quick look up – fuel efficient vehicles
- 4     Lesson: 12.3 More efficient appliances – notes  
Energy Conversion and Storage  
Lesson 12.4: Energy conversion technologies – notes  
Video: <https://www.youtube.com/watch?v=QKJbdUCETkY> Fuel efficient cars
- 5     Lesson: 12.5 Energy storage techniques – notes  
Lesson: 12.6 Energy available from nonrenewable reserves  
Lesson: 12.7 Renewable resources m- a projections  
Analyze figure 12.28 p480
- 6     Current event journal entry #4
- 7     Examine charts p489a and 489b and discuss  
Review game
- 8     Summary  
Study guide  
Test preparation
- 9     Key Terms p492
- 10    Test Chapter 12  
Complete Key terms for Chapter 13

## Unit Learning Goal and Scale

*(Level 2.0 reflects a minimal level of proficiency)*

**Standard:** HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

**DCI:** ESS3.C Human impacts on Earth systems – Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation.

<b>4.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li> <li>• Help other students in mastering the material</li> </ul>
<b>3.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Explain the differences of standard insulation ratings and their locations</li> <li>• Graph the fuel economy of vehicles versus the curb weight of the vehicle</li> <li>• Analyze ways of making vehicles more fuel efficient</li> <li>• Explain the appliance energy rating scale</li> <li>• Analyze which energy sources are good choices for the future</li> </ul>
<b>2.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Define and explain the difference between radiation, conduction, and convection</li> <li>• List some strategies to improve a living space's energy efficiency</li> <li>• Explain uses of a fuel cell</li> <li>• List energy sources that are good choices in the future</li> </ul>
<b>1.0</b>	<b>With help, partial success at level 2.0 content and level 3.0 content.</b>
<b>0.0</b>	<b>Even with help, no success.</b>

## Unit Modifications for Special Population Students

<b>Advanced Learners</b>	<p>Enrichment worksheets Assist struggling learners</p>
<b>Struggling Learners</b>	<p>Use differentiated instruction activities Pair with an advanced learner <a href="http://www.nj.gov/education/udl/">http://www.nj.gov/education/udl/</a></p>
<b>English Language Learners</b>	<p>Use ELL support activities as per ELL level <a href="http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf">http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf</a></p>
<b>Special Needs Learners</b>	<p>Follow IEP modifications Work with ICS Teacher to make material more achievable <a href="http://www.nj.gov/education/udl/">http://www.nj.gov/education/udl/</a></p>

## Interdisciplinary Connections

**Indicators:**

Mathematics – calculations, formulas, conversion from unit to unit, graphing, metrics, scientific notation

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## Integration of 21<sup>st</sup> Century Skills

**Indicators:**

Use of student computers for textbook, activities, handouts, current events, special focus, note taking, research

Lab activities and textbook activities that focus on STEM models of learning

Lab activities using lab technology and lab computer interfaces for precise measurements

<b>Unit Title: Chapter 13: Water Quantity</b>	
<b>Unit Description:</b> <i>Students will understand the importance of adequate quantities of quality water for meeting the needs of the modern society. They will also examine how the ocean effects our weather and climate. Students will study hurricanes, tsunamis and coastal erosion. Students will realize how much fresh water they use daily.</i>	
<b>Unit Duration: 16 days (approximately 3 weeks)</b>	
<b>Desired Results</b>	
<b>Standard(s):</b> HS-ESS3-3, HS-ESS2-6	
<b>Indicators:</b> ESS3.C, ESS3.D	
<p><b>Understandings:</b> <i>Students will:</i></p> <ul style="list-style-type: none"> <li>• Describe where the world’s water is located and determine how much is accessible for human use</li> <li>• Explain where we get our water</li> <li>• Explain the amount of fresh water compared to salt water</li> <li>• Summarize the role of the oceans in terms of climate moderation, oxygen production, biomass generation, and food production</li> <li>• Understand a current model and the effect of landmasses on current flow</li> <li>• Define El Nino and La Nina and explain how it effects the weather patterns</li> <li>• Describe a hurricane and explain why they are so dangerous</li> <li>• Tell how to prepare for hurricane</li> <li>• Explain why coastal erosion is a constant problem and how its impact can be minimized</li> <li>• Describe a tsunami and explain how tsunami devastation can be reduced</li> <li>• Explain how water supplies can be managed</li> <li>• Understand why topographic maps are important and how watersheds are involved</li> <li>• Create a topographic map</li> </ul>	<p><b>Essential Questions:</b></p> <ul style="list-style-type: none"> <li>• Where are the world’s water located?</li> <li>• Where do we get our fresh water?</li> <li>• Do we have enough fresh water?</li> <li>• What is the water table, ground water and aquifers?</li> <li>• How does the ocean change our weather and climate?</li> <li>• What is the Coriolis effect?</li> <li>• What is an El Nino?</li> <li>• What is a La Nina?</li> <li>• How does a hurricane start?</li> <li>• How do I prepare for a hurricane?</li> <li>• Where should I go during a hurricane?</li> <li>• How does coastal erosion occur?</li> <li>• What can be done to prevent coastal erosion?</li> <li>• What is a Tsunami?</li> <li>• What can be done to reduce the devastation?</li> <li>• How do we manage our water supplies?</li> <li>• How much water do I use on average daily?</li> <li>• How do you use a topographic map?</li> <li>• What is the importance of watersheds?</li> </ul>
<p><b>Performance Tasks:</b></p> <ul style="list-style-type: none"> <li>• Activity 13.1 and 13.5</li> <li>• Internet research – El Nino or La Nina?</li> <li>• Internet research – Cape May beach replenishment</li> </ul>	<p><b>Other Evidence:</b></p> <ul style="list-style-type: none"> <li>• Vocabulary Chapter 13 Quiz</li> <li>• Chapter 13 Test</li> </ul> <p>*Additional or alternative performance assessments may be used.</p>
<b>Benchmarks:</b> <b>Test Chapter 13</b>	

## Learning Plan

**Learning Activities:** (Lessons, handouts, special focus and STEM activities are found in the online textbook)

### Day   Activities

- 1     Earth's Water  
Activity 13.1 Water, water everywhere p 494  
Lesson: 13.1 Water distribution in the world -notes  
Questions in the margins
- 2     Lesson: 13.2 The ocean system – notes  
Video – NOAA Ocean Currents – on one drive  
Ocean Currents Worksheet [from internet]
- 3     Lesson: 13.3 El Nino – notes  
Research -online -Will there be a El Nino or La Nina or neutral pattern?  
Lesson: 13.4 Hurricanes – notes  
Video: <http://video.nationalgeographic.com/video/101-videos/hurricanes-101> Hurricanes 101
- 4     Special focus: Waves, currents and coastal erosion p506  
Discussion Cape May and Wildwood  
Research Cape May beach replenishment  
<http://www.capemaytimes.com/news/2017/01/cape-may-beach-sand/>  
<http://www.nj.gov/dep/shoreprotection/projects.htm>  
Special focus: Tsunamis p508  
Focus questions and tasks 509
- 5     Preparation for quiz  
Video: <http://video.nationalgeographic.com/video/101-videos/tsunami-101?source=searchvideo>  
Tsunami 101
- 6     Lesson: 13.5 Water in the Unites States – notes  
Water Management  
Lesson: 13.6 Dams and reservoirs - notes  
Video –<https://www.youtube.com/watch?v=2SD3Byta5RQ> Hoover dam
- 7     Complete video  
Chapter 13 quiz  
Lesson: 13.7 Water diversion projects – notes  
Focus watersheds. Examine figures p518 and 519
- 8     USGS Teaching Lesson: Topographic maps- notes  
Benchmarks, Topo symbols – worksheet  
Analyzing Washington Township Topographically from 1898 to now  
Surveying
- 9     Lesson: 13.8 Managing groundwater – notes  
Lesson: 13.9 Desalination - notes  
Lesson: 13.10 Water from icebergs – notes  
Lesson: 13.11 Cloud seeding – notes  
Lesson: 13.12 Municipal wastewater reclamation  
Research Cape May and Wildwood [http://www.pressofatlanticcity.com/news/press/cape\\_may/](http://www.pressofatlanticcity.com/news/press/cape_may/)
- 10    Lesson: 13.13 Water conservation  
Activity 13.5 How much water do you use. (hand out / work sheet filled out from previous  
Homework [Calculate average for student then class) Use own procedures  
Video <https://www.youtube.com/watch?v=4MDLpVHY8LE> water conservation
- 11    Review game

## Learning Activities: Continued

- 12 Summary  
Study guide  
Test preparation
- 13 Key Terms p534
- 14 Test Chapter 13  
Complete Key terms for Chapter 14
- 15-16 Video “Preparation for Storm emergencies – Twister, Hurricane, Water spouts, Twins, Tornadoes”

### Unit Learning Goal and Scale

*(Level 2.0 reflects a minimal level of proficiency)*

**Standard(s): HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.**

**DCI: ESS3.C The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.**

**HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.**

**DCI: ESS3.D Global climate change – Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities.**

4.0	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li> <li>• Help other students in mastering the material</li> </ul>
3.0	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Explain the percentage of fresh water vs salt water and the percentage of how much fresh water is currently available</li> <li>• Describe the differences in the water table, ground water and aquifers</li> <li>• Define the Coriolis effect</li> <li>• Analyze the differences between an El Nino and a La Nina</li> <li>• Describe how a hurricane is created</li> <li>• Describe how a tsunami is created</li> <li>• Analyze how we can manage our water supplies</li> <li>• Explain how coastal erosion occurs and what we do to slow or repair it</li> </ul>
2.0	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Describe and list where the world’s water is located</li> <li>• Explain where we get our fresh water</li> <li>• Briefly describe how ocean currents effect our weather and climate</li> <li>• Describe where you should go during a hurricane</li> <li>• Define a tsunami</li> <li>• Explain the importance of a topographic map</li> <li>• Define a watershed</li> </ul>
1.0	<p><b>With help, partial success at level 2.0 content and level 3.0 content.</b></p>
0.0	<p><b>Even with help, no success.</b></p>

## Unit Modifications for Special Population Students

<b>Advanced Learners</b>	Enrichment worksheets Assist struggling learners
<b>Struggling Learners</b>	Use differentiated instruction activities Pair with an advanced learner <a href="http://www.nj.gov/education/ud/">http://www.nj.gov/education/ud/</a>
<b>English Language Learners</b>	Use ELL support activities as per ELL level <a href="http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf">http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf</a>
<b>Special Needs Learners</b>	Follow IEP modifications Work with ICS Teacher to make material more achievable <a href="http://www.nj.gov/education/ud/">http://www.nj.gov/education/ud/</a>

## Interdisciplinary Connections

**Indicators:**

Mathematics – calculations, formulas, conversion from unit to unit, graphing, metrics, scientific notation

English – writing skills, reading skills, taking notes

Social Studies – current event

## Integration of 21<sup>st</sup> Century Skills

**Indicators:**

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Lab activities and textbook activities that focus on STEM models of learning

Lab activities using lab technology and lab computer interfaces for precise measurements

**Unit Title: Chapter 14: Water Quality**

**Unit Description:** *Students will understand the role of quality water in modern societies. They will examine the main causes of water pollution and its effects to our planet. Students will also examine how wastewater treatment plants work.*

**Unit Duration: 10 days (approximately 2 weeks)****Desired Results****Standard(s):** HS-ESS2-5**Indicators:** ESS2.C**Understandings:***Students will:*

- List the major categories of water pollutants
- Identify the main steps in the municipal water treatment process
- Analyze the quality of water samples
- Explain how eutrophication can be both slowed down and speeded up
- Identify the main steps in wastewater treatment
- Explain both on-site and natural wastewater treatment strategies
- Describe how groundwater can be polluted

**Essential Questions:**

- What are the main causes of water pollution?
- How does aquatic ecosystems get polluted?
- What is eutrophication?
- How does our ground water get polluted?
- How does a wastewater treatment plant work?

**Performance Tasks:**

- Dip strip water test

**Other Evidence:**

- Quiz Chapter 14
- Current Event Journal #5
- Chapter 14 Test

\*Additional or alternative performance assessments may be used.

**Benchmarks:****Test Chapter 14**

## Learning Plan

**Learning Activities:** (Lessons, handouts, special focus and STEM activities are found in the online textbook)

Day   Activities

- 1     Access to Clean Water and Pollution of Water  
Lesson: 14.1 Point and nonpoint sources - notes  
Lesson: 14.2 Major water pollutants -notes  
Simple dip strip water test pH, dissolved oxygen, coliform bacteria, nitrates and phosphates
- 2     Lesson: 14.3 Pollution of aquatic ecosystems – notes  
Lesson: 14.4 Eutrophication of Lakes - notes  
Lesson: 14.5 Pollution of groundwater -notes  
Review worksheet
- 3     Video: Explore More: Water Quality – on One Drive  
Questions and discussion  
Wastewater Treatment  
Lesson: 14.6 Primary treatment – notes
- 4     Lesson: 14.7 Secondary treatment – notes  
Lesson: 14.8 Tertiary treatment – notes  
Lesson: 14.9 Solids processing -notes  
Video: <https://vimeo.com/1973831> Wastewater Plant
- 5     Lesson: 14.10 On-site sewage treatment systems – notes (septic systems)  
Lesson: 14.11 Natural wastewater treatment strategies - notes  
Lesson: 14.12 Water purification in developing countries- notes  
Open notes quiz
- 6     Current event journal #5 – topic water pollution
- 7     Review game
- 8     Summary  
Study guide  
Test preparation
- 9     Key Terms p564
- 10    Test Chapter 14  
Complete Key terms for Chapter 15



## Unit Learning Goal and Scale

*(Level 2.0 reflects a minimal level of proficiency)*

**Standard: HS-ESS2-5 Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.**

**DCI: ESS2.C The roles of water in Earth’s surface processes – The abundance of liquid water on Earth’s surface and its unique combination of physical and chemical properties are central to the planet’s dynamics.**

<b>4.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li> <li>• Help other students in mastering the material</li> </ul>
<b>3.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• List the major categories of water pollution</li> <li>• Analyze a water sample using a dip strip test</li> <li>• Describe the steps in eutrophication</li> <li>• List and describe what happens in each step of a water treatment plant</li> </ul>
<b>2.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Given some examples of water pollution</li> <li>• Define eutrophication</li> <li>• Name the steps of a water treatment plant</li> <li>• Define a septic system</li> </ul>
<b>1.0</b>	<b>With help, partial success at level 2.0 content and level 3.0 content.</b>
<b>0.0</b>	<b>Even with help, no success.</b>

## Unit Modifications for Special Population Students

<b>Advanced Learners</b>	<p>Enrichment worksheets Assist struggling learners</p>
<b>Struggling Learners</b>	<p>Use differentiated instruction activities Pair with an advanced learner <a href="http://www.nj.gov/education/udl/">http://www.nj.gov/education/udl/</a></p>
<b>English Language Learners</b>	<p>Use ELL support activities as per ELL level <a href="http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf">http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf</a></p>
<b>Special Needs Learners</b>	<p>Follow IEP modifications Work with ICS Teacher to make material more achievable <a href="http://www.nj.gov/education/udl/">http://www.nj.gov/education/udl/</a></p>

## Interdisciplinary Connections

**Indicators:**

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Lab activities and textbook activities that focus on STEM models of learning

Lab activities using lab technology and lab computer interfaces for precise measurements

**Unit Title: Chapter 15: Resource Management: Air**

**Unit Description:** *Students will understand how human activities effect our atmosphere and global climate. They will examine the layers of our atmosphere. Students will determine how the climate is changing. They will also examine the levels of CO<sub>2</sub> and discuss ways to clean the air.*

**Unit Duration: 15 days (approximately 3 weeks)****Desired Results****Standard(s):** HS-ESS2-4**Indicators:** ESS2.D**Understandings:***Students will:*

- List three ways in which ecosystems can be damaged
- List the major layers of the atmosphere and briefly describe the importance of each layer
- Analyze the amount of air pollution generated by fossil fuel burning
- Develop a chart of the five major air pollutants by including type of pollutant, main source of the pollutant, harmful effects, and method of reducing each pollutant
- Explain how air pollutants are trapped in a thermal inversion
- Measure and record the pH of various solutions
- Analyze information gained on acid rain production to find possible solutions
- Describe several ways to clean the air
- Explain how an electric precipitator works
- Describe the formation of thunderstorms, tornadoes, thunder and lightning
- Explain the greenhouse effect
- Examine how the CO<sub>2</sub> levels have increased
- Define carbon sequestration
- List strategies to reduce CO<sub>2</sub> levels
- Define the importance of the Ozone layer

**Essential Questions:**

- What are three ways the ecosystem can be damaged?
- What are the layers of the atmosphere?
- What is the importance of each layer?
- Where in the atmosphere is all the water and weather located?
- How does driving automobiles add to air pollution?
- What are the five main air pollutants?
- How does acid rain form?
- What pH?
- What are some ways to clean the air?
- What is an electric precipitator?
- How does an electric precipitator work? What does it have in common at home?
- How makes a thunderstorm?
- What causes thunder and lightning?
- How does the greenhouse effect work?
- What is the Ozone layer?

**Performance Tasks:**

- Activity 15.3 ,15.8
- Lab – pH Lab
- Lab- patriotic colors

**Other Evidence:**

- Quiz Chapter 15
- Chapter 15 Test

\*Additional or alternative performance assessments may be used.

**Benchmarks:****Test Chapter 15**

## Learning Plan

**Learning Activities:** (Lessons, handouts, special focus and STEM activities are found in the online textbook)

### Day   Activities

- 1     Caretakers of the Global Environment  
Lesson: 15.1 Human actions and our environment -notes  
Activity 15.1 What's up there? – brainstorm, What does it do? – brainstorm  
Complete percent chart p 568  
Layers of atmosphere worksheet
- 2     Lesson: 15.2 Air quality – notes  
Activity 15.2 Driving our atmosphere crazy – discussion  
Lesson: 15.3 Air pollution: the big five - notes
- 3     Lesson: 15.3 continued – notes  
Special Focus – Thermal inversions  
Focus questions p577  
Review worksheet (preparation for quiz)
- 4     Lesson: 15.4 Indoor air pollution – notes  
Questions and tasks p 579 #1,2  
Video Bill Nye Atmosphere – on One Drive
- 5     Video –Air pollution – Everyone's problem (20 min)  
Quiz Chapter 15
- 6     Lesson: 15.5 Acid precipitation - notes  
Activity 15.3 Home sweet Lab -testing pH – dip strips  
Patriotic Color Lab
- 7     Lesson: 15.6 The effects of acid precipitation - notes  
Lesson: 15.7 Strategies for reducing air pollution – notes  
Read and discuss p593 Electrostatic precipitator – compare to home air cleaner.
- 8     Special Focus – Thunderstorms and tornadoes p 594  
Video <https://www.youtube.com/watch?v=O2k-quezPsA> How thunderstorms are formed  
Video <https://www.youtube.com/watch?v=eV44ELMFSSU> Lightning Nova  
Quiz preparation
- 9     Climate Change  
Lesson: 15.8 The greenhouse effect - notes  
Lesson: 15.9 The climate question – notes  
Activity 15.8 CO<sub>2</sub> and climate trends: You decide - p602
- 10    Quiz Chapter 15  
Lesson: 15.10 Carbon sequestration - a technical fix – notes  
Lesson: 15.11 Climate change: What we know from science – notes
- 11    Lesson: 15.12 Responding to climate change – notes  
Lesson: 15.13 The effect on particles on global temperature – notes  
Lesson: 15.14 Depletion of the Ozone layer – notes  
Discussion – Tanning and it's danger
- 12    Summary  
Study guide
- 13    Review game
- 14    Key terms p 722
- 15    Test Chapter 15  
Complete key terms on p722

**Unit Learning Goal and Scale**  
(Level 2.0 reflects a minimal level of proficiency)

**Standard: HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.**

**DCI: ESS2.D Weather and climate – The foundation for Earth's global climate systems is the electromagnetic radiation from the Sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space. Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate.**

<b>4.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li> <li>• Help other students in mastering the material</li> </ul>
<b>3.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• List the four layers of our atmosphere and give an example of its importance</li> <li>• Analyze the major air pollutants by type, effect and source</li> <li>• Explain the damage done by acid rain</li> <li>• Describe ways to clean the air</li> <li>• Describe how thunderstorms are created</li> <li>• Explain thunder and lightning</li> <li>• Examine the amount of CO<sub>2</sub> in our atmosphere by year</li> <li>• Define carbon sequestration</li> </ul>
<b>2.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• List three ways that an ecosystem can be damaged</li> <li>• Name the four layers of our atmosphere</li> <li>• Describe a thermal inversion</li> <li>• Define pH and its range</li> <li>• Explain the greenhouse effect</li> <li>• Realize that the amount of CO<sub>2</sub> in the atmosphere has increased</li> <li>• Define the importance of the Ozone layer</li> </ul>
<b>1.0</b>	<b>With help, partial success at level 2.0 content and level 3.0 content.</b>
<b>0.0</b>	<b>Even with help, no success.</b>

## Unit Modifications for Special Population Students

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<b>Struggling Learners</b>	Use differentiated instruction activities Pair with an advanced learner <a href="http://www.nj.gov/education/ud/">http://www.nj.gov/education/ud/</a>
<b>English Language Learners</b>	Use ELL support activities as per ELL level <a href="http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf">http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf</a>
<b>Special Needs Learners</b>	Follow IEP modifications Work with ICS Teacher to make material more achievable <a href="http://www.nj.gov/education/ud/">http://www.nj.gov/education/ud/</a>

## Interdisciplinary Connections

**Indicators:**

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**Unit Title: Chapter 18: Space Science**

**Unit Description:** *Students will understand Earth's place in the universe starting with the Big Bang and the formation of the elements and moving to the formation of the Sun and the solar system, and finally examining Earth's history of space science and its effect on society and technology.*

**Unit Duration: 16 days (approximately 3 weeks)****Desired Results****Standard(s):** HS-ESS1-2, HS-ESS1-3, HS-ESS1-4**Indicators:** ESS1.A, ESS1.B**Understandings:***Students will:*

- State the Big Bang theory
- Explain how elements were created in the Big Bang
- Further explain how stars create elements through fusion
- Describe how elements heavier than iron are made during a super nova
- Understand the importance of a star's spectra
- Define red and blue shift
- Describe the Sun and its lifetime
- Explain the life cycle of stars
- Determine the information revealed by an HR diagram
- Define a galaxy
- Describe Kepler's laws of planetary motion
- Examine the space race and its changes both social and technological

**Essential Questions:**

- What is the Big Bang theory?
- How were elements created in the Big Bang?
- How do stars create elements?
- What is a super nova?
- What is made during a super nova?
- What is a spectroscope?
- What can a star's spectra tell us?
- How does red a blue shift work?
- What do we know about the Sun?
- What are the life cycles of stars?
- What does a HR diagram show?
- What is a galaxy?
- What does Kepler's laws of planetary motion tell us?
- What are some of the importance of the space race?
- How did the space race change us?

**Performance Tasks:**

- Activity 15.3 ,15.8
- Lab – Spectroscope lab
- Lab – Planetary Data Lab

**Other Evidence:**

- Quiz Chapter 18
- Chapter 18 Test

\*Additional or alternative performance assessments may be used.

**Benchmarks:****Test Chapter 18****Final**

## Learning Plan

**Learning Activities:** (Lessons, handouts, special focus and STEM activities are found in the online textbook)

Day   Activities

- 1     Theories on How it Began  
Lesson: 18.1 The Big Bang -notes  
Lesson: 18.2 Problems with the Big Bang – notes  
Lesson: 18.3 Steady State theory – notes  
Lesson: 18.4 Problems with the steady state theory – notes  
Lesson: 18.5 Geometry of the universe - notes
- 2     Stars, Galaxies, and the Production of Elements  
Lesson: 18.6 Star formation – notes  
Special focus – spectra p 730  
Spectroscope Lab
- 3     Notes – The sun and its lifetime – (Physical Science text)  
Bill Nye Outer space -on One Drive
- 4     Lesson: 18.7 Classification of stars – notes  
The life cycle of stars worksheet  
H-R diagram worksheet #1  
H-R diagram worksheet #2
- 5     Video – Life cycles of stars a quantum leap  
Quiz preparation
- 6     18.9 What then in a galaxy?  
Notes -Kepler's laws 19-2 (Physical Science text)  
Planetary Data Lab and Data sheet
- 7     Discuss Planetary Data Lab  
Quiz Chapter 18  
Discussion – Alien life
- 8     Discussion – The Space Race  
Discussion – Life in the mid to late 1960's  
Discussion - Social and technological changes due to the space race and to Star Trek
- 9-11 Video – Star Trek 2009 reboot
- 12    Astronomy review packet
- 13    Discuss packet
- 14    Study guide
- 15    Review game
- 16    Test Chapter 18

### End of Marking Period 4

Final review  
Final

**Unit Learning Goal and Scale**  
(Level 2.0 reflects a minimal level of proficiency)

**Standard: HS-ESS1-2 Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.**

**DCI: ESS1.A The universe and its stars – The Big Bang theory is supported by observations of distant galaxies receding from our own, of the measured composition of stars and non-stellar gases, and of the maps of spectra of the primordial radiation that still fills the universe.**

**HS-ESS1-3 Communicate scientific ideas about the way stars, over their life cycle, produce elements.**

**DCI: ESS1.A The universe and stars – Other than the hydrogen and helium formed at the time of the Big Bang, nuclear fusion within stars produces all atomic nuclei lighter than and including iron, and the process releases electromagnetic energy. Heavier elements are produced when certain massive stars achieve a supernova stage and explode.**

**HS-ESS1-4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.**

**DCI: ESS1.B Earth and the solar system – Kepler’s laws describe common features of the motions of orbiting objects, including their elliptical paths around the sun. Orbits may change due to the gravitational effects from, or collisions with, other objects in the solar system.**

<b>4.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• In addition to achieving the completion of level 3 studies and performance, students will show an in depth knowledge of the material</li> <li>• Help other students in mastering the material</li> </ul>
<b>3.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Explain how the Big bang created the first elements</li> <li>• Analyze the process where stars create elements up to and including iron</li> <li>• Describe how heavier elements are created in a super nova</li> <li>• Create a list of information that can be determined by a star’s spectra</li> <li>• Describe the Sun</li> <li>• Explain the life cycles of stars</li> <li>• Explain what a HR diagram shows</li> <li>• Define Kepler’s laws of planetary motion</li> <li>• Explain the social and technological changes and advances created by the Space Race</li> </ul>
<b>2.0</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• State the Big Bang theory</li> <li>• Define a super nova</li> <li>• Describe a spectroscope</li> <li>• Describe the difference between red and blue shift</li> <li>• Define a galaxy</li> <li>• List Kepler’s 3 laws of planetary motion</li> <li>• Realize what the space race has done for our society and technology</li> <li>• Give examples of technology that was created for the space race</li> </ul>
<b>1.0</b>	<b>With help, partial success at level 2.0 content and level 3.0 content.</b>
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