Black Horse Pike Regional School District

Environmental Science Resource Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit 1: Astronomy

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Environmental Science/Astronomy** **Grade Level(s):** **9-12**	**Unit Summary**: This unit will explore the Earth's place in the universe and its characteristics in comparison to other objects in our solar system which make it uniquely suited for sustaining life. The unit will begin with an overview of the organization of the universe and an exploration of developments that led to our current understanding of the universe. Alternate theories as to the origin of the universe will be debated. The focus will then shift to the evolution of the universe and the creation of our solar system as described by the Big Bang Theory. The organization of our solar system and the characteristics of our sun make it possible for life on Earth. Students will research the characteristics of different objects in our solar system such as planets, moons and asteroids and use this research to determine if human life could be sustained elsewhere in the solar system with the assistance of technology.
Essential Question(s): 1. What do we mean in science when we say that we stand on the shoulders of giants? 2. How do science and technology influence each other? 3. How does scientific knowledge benefit – deepen and broaden - from scientists sharing and debating ideas and information with peers? 4. How does technology extend human senses and understanding of Earth? 5. What characteristics does our Sun share with other stars? 6. Is there order to the Universe? 7. How are planets and other objects in the Solar System	**Enduring Understanding(s):** 1. Understanding the development of scientific ideas is essential for building scientific knowledge. 2. Technology evolves at an ever accelerating pace based on the needs and wants of society, and is influenced by cultural, political, and environmental values and constraints. 3. The growth of scientific knowledge involves critique and communication - social practices that are governed by a core set of values and norms. 4. Technology enables us to better understand Earth's systems and the impact of Earth's systems on human activity. 5. The Sun is medium-sized, middle-aged star. 6. Observable, predictable patterns of movement in the Sun, Earth, and Moon system occur because of gravitational interaction and energy from the Sun. 6. The universe is composed of galaxies, each of which is composed of solar systems having the same elements and governed by the same

similar to and different from Earth? What implication does this have for the existence and sustaining of life on other planets?	laws. 7. Physical characteristics of planets depend on their distance from the Sun and their size. 7. The Earth's characteristics make it uniquely suited in our solar system for life to exist.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Discuss how our understanding of the universe and our solar system has changed as new technology has developed 2. List and evaluate the evidence for the Big Bang Theory 3. Compare and contrast competing theories for the formation of the universe. 4. Describe the evolution of the universe from its creation 13.7 BYA to the present 5. Describe the creation of our solar system from an accretion disc 6. Sequence the life cycle of a star based on its mass 7. Explain why the sun is considered an average star 8. Predict the fate of our sun based on its characteristics 9. Using the HR diagram, characterize how a stars color relates to its temperature. 10. Use mathematics to create a scale model of the solar system that accurately depicts distances between the sun and each of the planets 11. Explain how the tilt of the Earth on its axis affects seasonal variations in the Earth' 12. Analyze the potential for humans to colonize another planet	**1. Science:** 5.1 A (1-3), 5.1 C (1-3), 5.1 D (1-2), 5.4 A (1, 6) **Other Content Areas:** 6.1.12.C.11, 12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **2. Science:** 5.1 A (1-3), 5.1 C (1-3), 5.1 D (1-2), 5.4 A (5, 6 **) Other Content Areas:** 6.1.12.C.11, 12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **3**. **Science** 5.1 A (1-3), 5.1 C (1-3), 5.1 D (1-2), 5.4 A 5 **Other Content**

	Areas: 6.1.12.C.11, 12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **4. Science:** 5.1 A (1-3), 5.1 C (1-3), 5.1 D (1-2), 5.4 A 2 **Other Content Areas:** 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **5. Science:** 5.1 A (1-3), 5.1 C (1-3), 5.1 D (1-2) **Other Content Areas:** 2.2.12.B.1, 8.1.12.C.1, 9.1.12.A.1, 9.1.12.B, 9.4O, L.9-10.6 or L.1112.6, RI.9-10.2, 8 or RI.11-12.2, 8, RST.910.1, 9, 10 or RST.1112.1, 9, 10, SL.9-10. 1 through 6 or SL.11-12.1 through 6, W.9-10.1, 7 or W.11-12.1, 7, WHST.9-10.1, 5, 7, 8, 9 or WHST.11-12. 1, 5, 7, 8, 9 **6. Science:** 5.1 A (1-3), 5.1 C (1-3), 5.1 D (1-2), 5.4 A 5 **Other Content Areas:** 6.1.12.C.11, 12,

	7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **7. Science:** 5.1 A (1-3), 5.1 C (1-3), 5.1 D (1-2), 5.4 A 5 **Other Content Areas:** 6.1.12.C.11, 12, 7. 1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 8. **Science:** 5.1 A (1-3), 5.1 C (1-3), 5.1 D (1-2), 5.4 A (3, 5) **Other Content Areas:** 6.1.12.C.11, 12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **9. Science:** 5.1 A (1-3), 5.1 C (1-3), 5.1 D (1-2) **Other Content Areas:** 2.2.12.B.1, 8.1.12.C.1, 9.1.12.A.1, 9.1.12.B, 9.4O, L.9-10.6 or L.11-12.6, RI.9-10.2, 8 or

	RI.11-12.2, 8, RST.910.1, 9, 10 or RST.1112.1, 9, 10, SL.9-10. 1 through 6 or SL.11-12.1 through 6, W.9-10.1, 7 or W.11-12.1, 7, WHST.9-10.1, 5, 7, 8, 9 or WHST.11-12. 1, 5, 7, 8, 9 **10. Science:** 5.1 A (13), 5.1 C (1-3), 5.1 D (1-2) **Other Content Areas:** 2.2.12.B.1, 8.1.12.C.1, 9.1.12.A.1, 9.1.12.B, 9.4O, L.910.6 or L.11-12.6, RI.910.2, 8 or RI.11-12.2, 8, RST.9-10.1, 9, 10 or RST.11-12.1, 9, 10, SL.9-10. 1 through 6 or SL.11-12.1 through 6, W.9-10.1, 7 or W.1112.1, 7, WHST.9-10.1, 5, 7, 8, 9 or WHST.11-12. 1, 5, 7, 8, 9 **11. Science:** 5.1 A (13), 5.1 C (1-3), 5.1 D (1-2), 5. 4 F 1 **Other Content Areas:** 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **12. Science:** 5.1 A 2, 5.1 B (4, 5) 5.1 D1 **Other Content Areas:** 2.2.12.B.1, 8.1.12.C.1,

	9.1.12.A.1, 9.1.12.B, 9.4O, L.9-10.6 or L.1112.6, RI.9-10.2, 8 or RI.11-12.2, 8, RST.910.1, 9, 10 or RST.1112.1, 9, 10, SL.9-10. 1 through 6 or SL.11-12.1 through 6, W.9-10.1, 7 or W.11-12.1, 7, WHST.9-10.1, 5, 7, 8, 9 or WHST.11-12. 1, 5, 7, 8, 9

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, History, Language Arts and 21st Century Life and Careers. Students will be analyzing graphs, creating scale models of the solar system, writing persuasive essays, debating socio-political implications of technological advances and creating a power point presentation.

Examples: Solar System Scale Model

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Students will engage with the following text:

Earth Science, Glencoe – Students will use designated sections of the text to as a starting point for research into the objects in our solar system. Chapter 29

Examples: Complete the lab on pp 798-799 to further understanding of the scale of our solar system

Measuring the Big Bang Microviewer Slide Set - Students will read about the Big Bang theory and the evidence that supports and view slides that go along with the text. They will use the information from the activity to help them draw conclusions as to which theory of the universe's origin they find most acceptable.

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: photocopy pages from the textbook and give students reading materials in advance so they can pre-read, highlight, and ask questions, and then re-read materials in class; highlight or underline main ideas in reading materials or throughout power point; provide guiding

questions to complete when reading to ensure an understanding of key concepts; discuss answers to questions when completed to assess comprehension of all students; provide students with summaries.
For Solar System lab –read out loud and complete together on Smart Board.
For Big Bang Microviewer Slide Set – read Big Bang theory out loud and highlight all evidence that supports the theory, follow text with corresponding slide and discuss what is viewed.

Students will write:

Students will use Cornell note taking strategies, write essays, perform calculations in order to create scale models and create a power point presentation.

Examples: Big Bang Vs. Steady State persuasive essay
Planet Colonization Power Point (Planet Benchmark)
- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:
Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: provide students with paper set up in Cornell notes format when taking notes; provide students with guided notes or copies of notes; give graphic organizers and time lines to help students organize concepts when applicable; reduce length requirements for writing assignment; reduce number of open-ended responses; grade content instead of spelling/grammar/mechanics when grading written assessments.
For Big Bang vs. Steady State essay - list all supports for Big Bang Theory and reasons the Steady State and Oscillating Models are not valid on Smart Board, provide students with a written copy before the essay assignment, rewrite essay guidelines to limit writing to two paragraphs (four sentences each), give time and a half to complete essay with individual help offered three days after school in computer lab or LMC.
For Planet Colonization Power Point Presentation -guidelines read out loud and a list of planet choices to research will be provided, example skeletal slide to help organize planet information shown to students, offer individual help three days after school in computer lab or LMC, give time and a half to complete assignment, teacher will show and discuss grading rubric at the same time as guidelines, heavily weighted for visual/effort with no points deducted for grammar/spelling errors.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

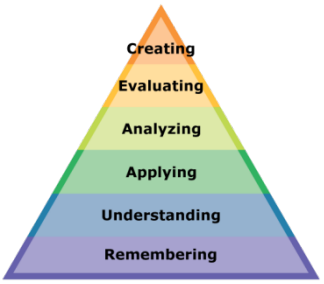
DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

- Students will be presented a historical overview of how the understanding of the universe and our solar system has changed with the developments of technology through power point presentation. The presentation will include an introduction to competing theories as to the origin of the universe. The students will discuss the information from the presentation and to draw a conclusion as to which theory is most likely. They will develop and present an argument to support their conclusion.
- Students will complete graphic organizers based on readings and study diagrams to develop a summary of the evolution of the universe from its creation 13.7 BYA to the present and the creation of our solar system from an accretion disc.

- Students will be presented with the different paths a stars life cycle can take through lecture and diagrams. The students will use the information to predict the fate of our sun.
- Students will study and discuss the HR diagram in pairs then use it to explain how a star's color relates to its temperature and explain why the sun is considered an average star.
- Students will engage the text book, use a teacher generated web quest and watch videos to gather information on objects in our solar system. They will work in groups to discuss the information they gathered and draw a conclusion as to whether or not it would be possible to colonize any of the objects. They will individually create power point presentations analyzing our ability to colonize elsewhere in our solar system.
- Students will work in teams to create a scale model using of our solar system using proportions.

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, text based questions and writing assignments.

Example: Text based questions to go along with pages 774-793 in Glencoe Earth Science - Remembering
Solar System Quiz- Understanding
Big Bang Vs. Steady State Essay- Evaluating

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.

Examples: Big Bang vs. Steady State Essay- list all supports for Big Bang Theory and reasons the Steady State and Oscillating Models are not valid on Smart Board, provide students with a written copy before the essay assignment, rewrite essay guidelines to limit writing to two paragraphs (four sentences each), give time and a half to complete essay with individual help offered three days after school in computer lab or LMC. Solar System Quiz – limit multiple choice answers to three choices instead of four, choose one open ended question instead of two

Summative Assessments:

Students will be required to take a test to demonstrate proficiency on the material presented in this unit.

Example: Astronomy Test - Evaluating

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.
Astronomy Test: limit multiple choice answers to three instead of four, put definition of luminosity next to diagram, choose two open ended questions instead of three, offer reading test aloud/rewording when necessary, give time and a half to complete test.

Performance Assessments:

Students will be required to turn in homework, based on the material in this unit. They will also be required to create a power point presentation on whether or not we could colonize another planet based off of their research.

Example: Reinforcement worksheet "The Reason for Seasons" - Analyze
Planet Colonization Power Point Presentation - Create

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Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.
Planet Colonization Power Point Presentation: guidelines read out loud and a list of planet choices to research will be provided, example skeletal slide to help organize planet information shown to students, offer individual help three days after school in computer lab or LMC, give time and a half to complete assignment, teacher will show and discuss grading rubric at the same time as guidelines, heavily weighted for visual/effort with no points deducted for grammar/spelling errors.

Black Horse Pike Regional School District Curriculum Template
Environmental Science Curriculum

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Unit 2: Earth's History

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title:	**Unit Summary**:
Environmental Science/ Earth History/Clues to Earth's Past **Grade Level(s): 9-12**	Following the astronomy unit, students begin this unit with an understanding of how planets form and that complex life is unique to this planet. The Earth has gone through many transitions in its 4.5 billion year history. The Earth cooled to the point that a crust formed on its surface, tectonic activity ensued and the ocean basins filled with water. As life evolved, it entered into a complex interdependence with the planet's material and energy cycles. Students will learn how to use fossil evidence to track these changes with an eye to using the past to predict the future.
Essential Question(s): 1. **What transitions has Earth gone through towards its present conditions?** 2. **How does evidence of Earth's past inform us about today's conditions?**	**Enduring Understanding(s):** 1. Earth formed by accretion and eventually cooled to the point that a crust formed on its surface, tectonic activity ensued and the ocean basins filled with water. 2. As life evolved, it entered into a complex interdependence with the planet's material and energy cycles. 1. By studying geological and fossil evidence, we have been able to develop a 4.5-billion-year timeline describing the events associated with the formation and evolution of the Earth's ecosystems and biota. 2. The fossil record is useful not only for comprehending the history of life but also in the search for natural resources, and in discerning how our activities may impact the environment at various scales.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Describe processes of, and conditions for, fossil formation. 2. Explain how fossil correlation is used to determine relative rock ages. 3. Explain how radioactive dating is used to determine absolute fossil ages. 4. Determine how fossils can be used to explain changes in Earth's surface, life forms, and environments. 5. Use index fossils to locate natural resources such as fossil fuels. 6. Trace the evolution of Earth's atmosphere. 7. Assess evidence for mass extinction events.	**1. Science:** 5.4.12.B.1 **Other content areas**: 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) **2. Science:**5.4.12.B.2 **Other content areas**:

	4.1A, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) **3. Science:**5.1.12.A.2, 5.4.12.B.3 **Other content areas**: 3.1G, 3.2A, 3.2B, 3.2C, 3.2D, 3.5A, 3.5B, 4.1A, 6.2C, 8.1A, 8.1F, 8.2B, 9.1A, 9.1B, 9.1F, 9.4A, 9.4O, 9.4O (1), 9.4O (2) **4. Science:**5.4.12.B.1 **Other content areas**: 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) **5. Science:**5.4.12.B.1,2 **Other content areas**: 4.1A, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) **6. Science:**5.1.12.A.2, 5.4.12.B.1 **Other content areas**: 3.1G, 3.2A, 3.2B, 3.2C, 3.2D, 3.5A, 3.5B, 4.1A, 6.2C, 8.1A, 8.1F, 8.2B, 9.1A, 9.1B, 9.1F, 9.4A, 9.4O, 9.4O (1), 9.4O (2) **7. Science:**5.4.12.B.1,3 **Other content areas**: 4.1A, 6.2C, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2)

Inter-Disciplinary Connections:

Material presented in this unit connects with material in art as students can create newspapers to depict a mass extinction event.
Material presented in this unit connects with math, as students can apply probability and graphing to radiometric dating in the Twizzler Lab.
Material presented in this unit connects with social studies as students can investigate the role of paleontology in oil exploration. http://www.pbs.org/americanfieldguide/teachers/fossils/fossils_unit.html#2

Material presented in this unit connects with material in art as students can create newspapers to depict a mass extinction event.
Material presented in this unit connects with math, as students can apply probability and graphing to radiometric dating in the Twizzler Lab.

Material presented in this unit connects with social studies as students can investigate the role of paleontology in oil exploration. http://www.pbs.org/americanfieldguide/teachers/fossils/fossils_unit.html#2

Students will engage with the following text:

Glencoe's *Earth Science* Chapters 13 and 14
Example: "Fossil Scavenger Hunt": Examine the fossil molds and match them to the photos. Interpret them to answer the questions.
Supplemental materials are available in the "workbooks"
- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Modifications/Accommodations:
Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: photocopy pages in the textbook and give students reading materials in advance so they can pre-read, highlight, ask questions, and then re-read materials, highlight or underline main ideas in reading materials, provide guiding questions to complete when reading to ensure an understanding of key concepts, discuss answers to questions when complete to assess comprehension of all students, provide students with summaries.
For Fossil Scavenger Hunt: Give prompts to assist with the interpretation each figure and/or photo.

Students will write:

Students will use Cornell note-taking strategies, write responses to warm up questions, exit tickets, and answer conclusion questions in labs. Literacy strategies such as Think, Pair & Share may also be used.
Students can write reflections on fossils found in the US and essays on the geological history of New Jersey.
- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Modifications/Accommodations:
Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: provide students with paper set up in Cornell notes format when taking notes, provide students with guided notes or copies of notes, give graphic organizers and time lines to help students organize concepts when applicable, reduce length requirement for writing assignments, reduce number of open-ended responses, grade content not spelling/grammar/mechanics when grading written assessments.
For Fossil history of the US: read articles about fossil finds in the US out loud in small groups, have students write true or false for each statement after each one is read out loud, read discussion questions as a group and have one group member record group answers.
For Geological history of NJ: limit data chart to organism and environment categories on guidelines, discuss organisms and environment of each period as a class recording information on the Smart Board or dry erase board, give written summaries of all time periods with descriptions of organisms and environment filled in, reduce time periods from five to three on essay requirements, give option of creating an illustrated time line, grade content not spelling/grammar/mechanics.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

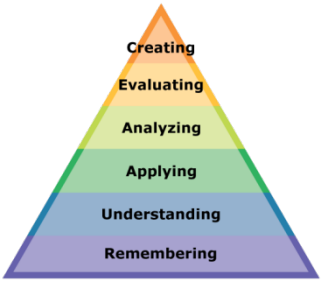
How will students uncover content and build skills.

In addition to taking Cornell notes during lecture-discussions facilitated by PowerPoint, Prezi and other technology-based visual aids, students will perform hands-on experiments, such as the Twizzler/M&M radioactive dating lab, and inquiry-based activities such as case studies (http://www.pbs.org/americanfieldguide/teachers/fossils/fossils_unit.html#2) as well as POGILs. Literacy strategies such as Think, Pair & Share may also be used.

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

Examples:

Formative assessments will be in the form of oral questions and answer, periodic quizzes, text-based questions and lab conclusion questions. In addition to quizzes, students will answer questions on lab activities. (Remembering through Analyzing)

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs

For Oil Exploration Lab: complete all conclusion questions together with student responses recorded on Smart Board. For M&M Radioactive Dating Lab: use Smart Board to collect all student data, set up line graph of data (x and y axis, title, increments) before requiring independent completion.

Summative Assessments:

To demonstrate proficiency on the material presented in this unit, students will be required to take a test that includes multiple choice, true-false, matching and open-ended questions. (Remembering through Analyzing)

Case study on the mass extinction event that claimed the dinosaurs. (Remembering through Evaluating)

Students can write narratives describing the geological history of NJ based on the fossil record. (Remembering through Creating)

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.

For Earth History Test - study guide provided prior to test, two test periods given to complete the test instead of one, create two word banks of ten terms/concepts each, bold x and y axis of half-life graph, provide three geological principles for question, offer test questions read aloud/reworded. For **Case Study - Read through and discuss case studies instead of independent reading, list lines of evidence for mass extinction, students will brainstorm and summarize aloud/teacher will write on Smart Board.**

Performance Assessments:

Students can be presented with a case study on mass extinction. (Remembering through Evaluating)

Students can conduct research in order to create newspaper front pages covering the events of a mass extinction. (Remembering through Creating)

Oil Exploration Lab http://www.pbs.org/americanfieldguide/teachers/fossils/fossils_unit.html#2 (Remembering through Evaluating)

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.

For Case Study - read through and discuss case studies instead of independent reading, list lines of evidence for mass extinction, students will brainstorm and summarize aloud/teacher will write on Smart Board.

For Newspaper- read guidelines aloud, limit choices of extinctions to three, give time and a half to complete project with three additional days offered in computer lab or LMC after school with teacher.

For Oil Exploration Lab- student recorder will complete chart on Smart Board with peers input.

For M & M Radioactive Dating Lab- divide class into groups prior to lab based on academic/social ability, teacher will demonstrate procedure before lab completed collaboratively.

Black Horse Pike Regional School District Curriculum Template
Environmental Science Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit 3: Plate Tectonics

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Environmental Science/ Plate Tectonics** **Grade Level(s):** **9-12**	**Unit Summary**: Following the Earth history unit, this unit emphasizes the development of the theory of plate tectonics based on empirical evidence used to support the hypotheses of continental drift and seafloor spreading. This unit requires an understanding of an Earth that gradually changes over billions of years to appreciate a slow process that results in phenomena ranging from mountain formation to earthquakes. In light of the pressure built up at Earth's plate boundaries, earthquakes and volcanoes occur, causing great concern for those who wonder if we can predict or prevent natural disasters. This unit begins the theme of awareness and action, in which the students can participate in careers that require an understanding of Earth's structure and processes.
Essential Question(s): 1. How was the theory of plate tectonics developed? 2. How can we predict the likelihood of an earthquake or volcanic eruption? 3. What is the impact of earthquakes and volcanic eruptions on the environment and civilization?	**Enduring Understanding(s):** 1. Scientists including Wegener and Harry Hess developed the theory of plate tectonics after decades of research. 2. Correlating the hypotheses of continental drift and seafloor spreading has led to our understanding of the structure and dynamics of the Earth's crust. 3. Plate tectonics is responsible for features found at different types of plate boundaries and can be examined to assess the likelihood of potentially catastrophic events like earthquakes and volcanic eruptions in different parts of the world. 4. By understanding the mechanisms of plate tectonics we can develop efforts to predict natural disasters, prevent and limit loss of life and property, and provide relief from earthquakes (and the resulting tsunamis) and volcanic eruptions.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS. After each target, identify the NJCCCS or Common Core Standards that are applicable <u>Learning Target</u>	<u>**NJCCCS or CCS**</u>
1. Evaluate evidence for continental drift 2. Evaluate evidence for seafloor spreading 3. Describe the theory of plate tectonics. 4. Describe the convection current mechanism that drives plate tectonics 5. Analyze the movement of earth's plates in terms of speed and direction 6. Model the movement of earth's plates at the three types of plate boundaries. 7. Predict what geological features may be found at plate tectonics, or caused by plate movements	**1. Science:** 5.1.12.A.1, 5.4.12.D.1 **Other content areas**: 3.1H, 3.2B, 3.2C, 3.2D, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) **2. Science:** 5.1.12.A.1,

8. Explain how movement of rock at plate boundaries causes earthquakes 9. Determine the epicenter of an earthquake by using the modified Mercalli scale 10. Predict the relative probability of earthquakes in locations such as California, the Ring of Fire and NJ. 11. Propose safety measures to be taken before, during and after an earthquake. 12. Determine types of volcanic eruptions based on magma composition 13. Propose safety measures to be taken before, during and after volcanic eruption.	5.4.12.D.1, 2 **Other content areas:** 3.1G, 3.1H, 3.2A, 3.2B, 3.2C, 3.2D, 3.5A, 3.5B, 4.1A 8.1A, 8.1E, 8.1F, 8.2B, 8.2G, 9.1A, 9.1B, 9.1D, 9.1F, 9.4A, 9.4O, 9.4O(1), 9.4O(2) **3. Science:** 5.1.12.A.1, 5.1.12.C.1 5.4.12.D.1, 2 **Other content areas:** 3.1H, 3.2A, 3.2B, 3.2C, 3.2D , 4.1A, 6.2A, 6.2B, 6.2C, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) **4. Science:** 5.4.12.D.1**Other content areas**: 3.1H, 3.2B, 3.2C, 3.2D, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1) **5. Science:** 5.4.12.D.1**Other content areas:** 3.1H, 3.2B, 3.2C, 3.2D, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) **6. Science:** 5.1.12.B.2, 5.4.12.D.1,2 **Other content areas:** 3.1H, 3.2B, 3.2C, 3.2D , 4.1A, 6.2A, 6.2B, 6.2C, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) **7. Science:** 5.1.12.A.1, 5.4.12.D.1,2 **Other content areas:** 3.1H, 3.2B, 3.2C, 3.2D , 4.1A, 6.2A, 6.2B, 6.2C, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2)

	8. **Science:** 5.4.12.D.1 **Other content areas**: 3.1H, 3.2B, 3.2C, 3.2D, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) 9. **Science:** 5.1.12.B.4, 5.1.12.C.1, 5.4.12.D.1 **Other content areas:** 3.1G, 3.1H, 3.2A, 3.2B, 3.2C, 3.2D, 3.5A, 3.5B, 4.1A, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) 10. **Science:** 5.4.12.D.1 **Other content areas:** 3.1H, 3.2B, 3.2C, 3.2D, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) 11. **Science:** 5.4.12.D.1 **Other content areas:** 3.1H, 3.2B, 3.2C, 3.2D, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) 12. **Science:** 5.4.12.D.1 **Other content areas:** 3.1H, 3.2B, 3.2C, 3.2D, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2) 13. **Science:** 5.4.12.D.1 **Other content areas:** 3.1H, 3.2B, 3.2C, 3.2D, 8.1A, 8.1F, 9.1A, 9.1B, 9.1C, 9.1D, 9.1E, 9.4A, 9.4O, 9.4 O(1), 9.4O(2)

Inter-Disciplinary Connections:

Material presented in this unit connects with material in math when calculating the speed and distance of tectonic plate movements, and the age of seafloor rocks.
Material presented in this unit connects with material in social studies when they trace the development of the theory of plate tectonics in light of 20th century history.

Material presented in this unit connects with material in art when they use clay to model plate tectonic boundaries.

For standards, see above.

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Students will engage with the following text:

Glencoe *Earth Science* -- Chapters 17-19
Students will also read current events articles from online news sources.
Supplemental materials are available in the "workbooks"

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: photocopy pages from the textbook and highlight or underline main ideas in reading materials prior to assigned reading, read passages aloud to students; incorporate media/audio visual representation(You Tube, Discovery Education), give students reading material or pages to read in advance so that they can pre-read, ask questions, and then re-read materials, provide guided questions to complete when reading to ensure an understanding of main ideas and key concepts, discuss answers to questions when complete to assess comprehension of all students, provide students with summaries.

Students will write:

Students will use Cornell note-taking strategies, write responses to warm-up questions and answer conclusion questions in labs. Literacy strategies such as Think, Pair & Share may also be used.
They can also write a narrative of a natural disaster caused by an earthquake (tsunami) or volcanic eruption. For example, see http://geobytesgcse.blogspot.com/2007/01/volcano-case-study-mount-st-helens-1980.html

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: provide students with guided notes or a copy of notes, offer students extended time on writing assignments; reduce length requirement for writing assignments, provide guiding questions for written responses, give checklists or step-by-step directions for assignments, reduced number of open-ended responses, provide graphic organizers to help students organize their writing, grade on content, not spelling/grammar/mechanics, provide extra space for students with poor or large handwriting, offer choice of typing responses if available, writing prompts when answering critical thinking questions.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

In addition to taking Cornell notes during lecture-discussions facilitated by PowerPoint, Prezi and other technology-based visual aids, students will use online simulations on earthquakes and volcanoes. Literacy strategies such as Think, Pair & Share may also be used. Student-centered approaches include the following:

Modeling the development of plate tectonics through paper simulations.

Simulating and analyzing the composition of magma through a hands-on experiment.

Using the modified Mercalli scale to locate the epicenter of an earthquake.

Participating in inquiry-based activities such as case studies and POGILs.

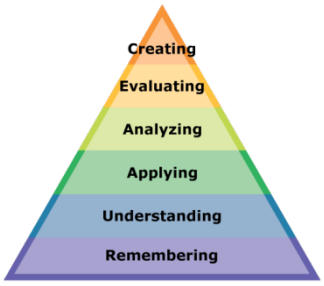
- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder **Accommodations/Modifications:**

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to:

Cornell note-taking: provide paper for note-taking set up in Cornell notes format; pre-teach necessary vocabulary and skills, provide students with guided notes or copies of notes, break lectures into shorter portions, use time lines and graphic organizers when taking notes

Online simulations and labs: pre-teach necessary vocabulary and skills, provide step-by-step directions/guidelines, and verbally re-state written directions prior to assignment, chunk assignment to allow the teacher to assess comprehension of each section prior to moving into the next section.

For Mercalli Scale Lab: provide step-by step directions for assignment, read all directions out loud, create Mercalli scale rankings in groups, demonstrate concentric looping to properly locate epicenter



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of oral questions and answer, periodic quizzes, text-based questions and lab conclusion questions. Students can produce earthquake safety posters or creating an earthquake safety video. (Remembering through Applying)

Students can complete a volcano case study (http://www.explorevolcanoes.com/volcano-casestudies.html (Remembering through Evaluating)

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to:
For Earthquake Safety Poster or video: provide written copy of precautions before, after, during; provide paper for poster, rubric emphasizing creativity and effort not spelling/grammar/mechanics, reduce number of required safety precautions (modified rubric found in TC shared, science, Sedgwick 2012 environmental curriculum). For Volcano Case Study: use Smart Board to demonstrate navigating through websites prior to independent web quest.

Summative Assessments:

To demonstrate proficiency on the material presented in this unit, students will be required to take a test that includes multiple choice, true-false, matching and open-ended questions. (Remembering through Analyzing)
Students can research news stories on natural disasters (either earthquake or volcanic eruption), which can be presented via traditional writing assignment, oral presentation or Xtranormal.com presentation. (Remembering through Creating)

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to the following:
For Breaking News Presentation: set aside first day for visual tutorial of Xtranormal website to show how to set up an account and then step by step directions on making of video, provide a list and short summaries of major earthquakes and major volcanic eruptions for student to select a desired topic, provide a written and verbal set of step-by-step guidelines for the project, allow student choice of Power point presentation, Xtranormal movie, or traditional writing assignment, generate and discuss grading rubric prior to creation of presentation and focus on use of class time, creative effort, and relevant information when grading, require five instead of nine of the relevant information on rubric, provide minimum of three class periods in the computer lab for teacher to provide individual assistance when needed, offer additional days of teacher assistance after school prior to due date.

Performance Assessments:

Students can research news stories on natural disasters (either earthquake or volcanic eruption), which can be produced via traditional writing assignment, oral presentation or Xtranormal.com presentation. (Remembering through Creating)
Modified Mercalli lab (Remembering through Evaluating)
- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.

Modified Mercalli Lab: provide step-by step directions for assignment; read all directions out loud, create Mercalli scale rankings in groups, demonstrate concentric looping to properly locate epicenter.

Black Horse Pike Regional School District Curriculum Template
Environmental Science Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit 4: Atmosphere

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Environmental Science /** **Atmosphere** **Grade Level(s): 9-12**	**Unit Summary**: This unit investigates the properties of atmosphere and the implication of those properties to the possibility of life on earth as we know it. In this unit, the students will focus on the importance, composition, and function of the atmosphere. Students will investigate the layers of the atmosphere and the important features in each. Students will identify trends in the atmosphere such as air pressure and temperature and the implications of these trends. Students will investigate how energy is transferred through the atmosphere and its connection with the processes in the water cycle and air movement. Students will identify and evaluate changes that have taken place in the atmosphere both natural and manmade. The concept of climate change through the topics of atmospheric gas composition and the greenhouse effect will be introduced. Students will be asked to evaluate the effect on human impact on natural systems. Students will develop a better understanding of this unit by using information presented in previous units. One such example can be seen in the Earth History Unit, where similar themes can be identified. It was discussed that as the planet changed over geologic time, so did the composition of the atmosphere which contributed to the evolution of life forms on Earth. Directly prior to this unit, students investigated the properties of the plate tectonics and earthquakes. Students will use the concepts presented in this unit to develop a better understanding in future units. One such example can be seen in the Climate Change Unit, where similar themes can be identified such as the greenhouse effect and global warming. Also, students will use this information to assist in evaluating resource usage.
Essential Question(s): 1. What is the function of the atmosphere? 2. What makes up the atmosphere? 3. How is energy transferred through the atmosphere? 4. What are the important processes in the water cycle? 5. How has the	**Enduring Understanding(s):** 1. The earth provides an array of natural services such as the maintenance of the quality of the atmosphere, soils, hydrologic cycle, disposal of waste, and recycling of nutrients. Disruption of these natural services through such activities as harvesting natural resources may result in negative environmental, health, and economic consequences. 2. The chemical and physical properties of the vertical structure of the atmosphere support life on Earth. Through analyzing atmospheric structure global, regional and local variations can be identified and implication for life can be studied. 3. The sun is the major external source of energy for Earth's global energy

atmosphere changed over time?	budget. These energy sources run earth's natural services such as the hydrologic cycle and movement of matter. 4. Earth's hydrologic cycle is complex, involves many processes, and varies globally, regionally, and locally. 5. The composition of the atmosphere has changed throughout time. This change can be natural as in the development of oxygen and an ozone layer which can be traced through rock layers. These changes can cause dramatic shifts in life's evolution. Human activities have changed Earth's land, oceans, and atmosphere. Human interactions can disrupt the stability of the atmosphere and the services provided. These activities include the burning of fossil fuels which can be studied by evaluating the addition of greenhouse gases to the atmosphere and global average temperatures. Scientific, economic, and other data assists in assessing environmental risks and benefits associated with societal activity such as the large scale adoption of emerging technologies.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Identify the functions of the atmosphere. **2. Identify the composition of gases that make up the atmosphere.** **3. Identify the layers of the atmosphere in order.** **4. Identify the important characteristics of each layer.** **5. Describe the function of the ozone layer.** **6. Describe how energy is transferred through the atmosphere.** **7. Describe the processes in order involved in the hydrologic cycle.** **8. Describe the formation of the atmosphere.** **9. Describe the effect of CFC's on the ozone layer.** **10. Identify types of greenhouse gases and their sources.** **11. Describe the functions of greenhouse gases and their connection with global warming.** **12. Compare and contrast benefits and drawbacks of the greenhouse effect.** **13. Describe the Coriolis Effect.** **14. Describe prevailing winds, the gulf and jet stream, sea and land breezes and its effect on our weather.**	**1. Science:** 5.4 C-2 **Other content standards**: 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **2. Science:** 5.4 C-2 **3. Science:** 5.4 C-2 **4. Science:** 5.4 C-2, G-2 **Other content standards:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.13, 6.1.12.B.16 **5. Science:** 5.4 C-2, G-2

	6. Science: 5.4 E-1,2 5.4 G-3 **Other content standards:** 6.1.12. C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, N-Q.1, 3, ACED.1, A-REI.10, 11, FBF. RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, S-IC.6, S-ID.1, 9, WHST.910.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **7. Science:** 5.4 E -1,2 F-3 G-3,7 **Other content standards:** 6.1.12.B.1, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **8. Science:** 5.4 B-1, C-2 **Other content standards:** 6.1.12.D.6, 6.1.12.C.12, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **9.Science:** 5.3 C-2,

	G-5,6 10. **Science:** 5.4 C-2, F-2 11. **Science:** 5.4 F-2 12. **Science:** 5.3 C-2, 5.4 G-5,6 13. **Science:** 5.4 E-1,2 G-3 14. **Science:** 5.4 E-1,2 G-3

Inter-Disciplinary Connections:

Material in this section will connect with material in Math, History, and Language Arts. Students will need to analyze quantitative data, graphs, and draw conclusions. Students will also need to discuss how social and economic activity may contribute to environmental issues and solutions.

Examples:
Lab Activity – Layers of the Atmosphere Poster Project
Lab Activity – Greenhouse Effect Simulation

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Students will engage with the following text:

Textbook – Earth Science Glencoe Ch 11-13
"Earth's Clouds Alive with Bacteria" – Article on LiveScience.com

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder **Accommodations/Modifications:**

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to : photocopy pages from textbook and give students reading materials in advance so they can pre-read, highlight, ask questions, and then re-read materials, highlight or underline main ideas in reading materials, provide guiding questions to complete when reading to ensure an understanding of key concepts, discuss answers to questions when complete to assess comprehension of all students, provide students with summaries, reduce length of reading by highlighting the most important concepts.

Students will write:

Students will use Cornell note taking strategies, write written responses to warm up questions, and summarize notes from class discussion. Students will also in a paragraph summarize events that occur in the water cycle and identify human activities that contribute to water pollution issues. Students will write free response answers to questions posed in such activities as the Greenhouse Effect Simulation and unit study guide.

Example:
Water Cycle Diagram
Atmosphere Study Guide
- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder
Accommodations/Modifications:
Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: provide students with paper set up in Cornell notes format when taking notes, writing prompts when answering critical thinking questions, reduce amount of writing, grade content not spelling/grammar/mechanics when grading written assessments.
For water pollution issue activity: identify human activities that contribute to water pollution issues and then record on board together.
For water cycle: provide students with copy of water cycle illustration and discuss the cyclic movement of water throughout the planet, list events that occur in the water cycle and give written copy of events to students before having summarize events that occur in paragraph form.
For Greenhouse Effect Simulation: have students read opening paragraph out loud together and underline four tasks before beginning web quest, open website on Smart Board and show how to maneuver through site before students work independently, give time and a half to complete lab, answer comprehension questions together on Smart Board after Part 2 is complete.
For study guide: provide written copy of notes corresponding with objectives on study guide, provide specific page numbers of where to locate answers within textbook, go over all answers to study guide together as a class.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

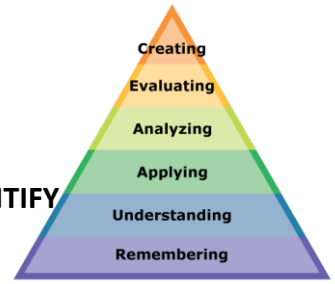
<u>How</u> will students uncover content and build skills.

- Students will be presented with information through power point presentation which will utilize multimedia videos and interactive maps and diagrams.
- Students will investigate concepts through guided class discussion lead by teacher based questions.
- Small group discussion as students work in groups to use notes and textbook to construct atmosphere poster.
- The students will reinforce concepts by completing a graphic visual such as with the water cycle.
- The students will reinforce concepts by completing free response questions given on a unit study guide.

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

Students will demonstrate understanding through responses to class discussion, warm up questions, quizzes, and level of difficulty when completing class work activities.

Example:

Atmosphere Quiz – Remembering & Understanding (multiple choice), Applying & Analyzing (diagram completion & free response question)

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.

Atmosphere Quiz – limit multiple choice answers to three instead of four, list the five layers of the atmosphere and have students write numbers to put them in correct order (modified quiz on TC shared, science, Sedgwick 2012 environmental curriculum).

Summative Assessments:

Students will demonstrate mastery of unit content and concepts through completing lab activities and unit exams.

Example:

Lab Activity: Layers of the Atmosphere Poster Project – R, U, Ap, An, E, C
Lab Activity: Greenhouse Effect Simulation – R, U, Ap, An, E
Lab Activity: Water Cycle Diagram – R, U, Ap, An, E, C
Lab Activity: Predicting the weather - R, U, Ap, An, E, C
Lab Activity: Major air masses across the US - R, U, Ap, An, E, C
Atmosphere Test – R, U, Ap, An, E

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.

Water Cycle Diagram - provide students with copy of water cycle illustration and discuss the cyclic movement of water throughout the planet, list events that occur in the water cycle and give written copy of events to students before having them summarize in paragraph form, change guidelines for paragraph to fill in notes that student will attach to diagram.

Greenhouse Effect Simulation –have students read opening paragraph out loud together and underline four tasks before beginning web quest, open website on Smart Board and show how to maneuver through site before students work independently, give time and a half to complete lab, answer comprehension questions together on Smart Board after Part 2 is complete.
Air mass project – use diagram page 303
Atmosphere Test – limit multiple choice answers to three instead of four, provide a word bank to complete water cycle diagram, offer questions read aloud/rewording if necessary, two class periods to complete instead of one if needed.

Performance Assessments:

Students will demonstrate mastery of performance skills through completion of lab activities.

Example:
Lab Activity: Layers of the Atmosphere Poster Project – R, U, Ap, An, E, C
Lab Activity: Greenhouse Effect Simulation – R, U, Ap, An, E
Lab Activity: Water Cycle Diagram – R, U, Ap, An, E, C
Lab Activity: Predicting the weather - R, U, Ap, An, E, C
Lab Activity: Major air masses across the US - R, U, Ap, An, E, C

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING

2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.
Water Cycle Diagram: - provide students with copy of water cycle illustration and discuss the cyclic movement of water throughout the planet, list events that occur in the water cycle and give written copy of events to students before having them summarize in paragraph form, change guidelines for paragraph to fill in notes that student will attach to diagram.
Greenhouse Effect Simulation –have students read opening paragraph out loud together and underline four tasks before beginning web quest, open website on Smart Board and show how to maneuver through site before students work independently, give time and a half to complete lab, answer comprehension questions together on Smart Board after Part 2 is complete.
Layers of the Atmosphere Poster Project –measure layers label the layers, and paste in correct order together as a class, students will only fill out temperatures from page 274 independently.

Black Horse Pike Regional School District Curriculum Template
Environmental Science Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit 5: Climate

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Environmental Science/** **Climate** **Grade Level(s): 9-12**	**Unit Summary**: This unit investigates the properties of climate and the implication of those properties to the creation of habitats for living organisms. In this unit, the students will focus on the difference between weather and climate. Students will investigate the globe and the factors that determine climate. Students will investigate microclimates created by mountains, bodies of water, and cities to develop an understanding of the implications of climate. Students will then compare and contrast terrestrial biomes and organisms adaptations for survival. Students will evaluate how these biomes have been affected by human impact such as habitat destruction. Students will be introduced to the concept of climate change through the topics of the carbon cycle and the greenhouse effect. Again students will be asked to evaluate the effect on human impact on natural systems. Students will be asked to develop solutions and plans for the environmental issues presented in this unit. Students will develop a better understanding of this unit by using information presented in previous units. One such example can be seen in the Earth History Unit, where similar themes can be identified. It was discussed that as the climate of the planet changed over geologic time, so did the evolution of life forms on Earth. Major changes, such as the creation of the ozone layer by cyanobacteria, have set the stage for modern life and terrestrial biomes. Major changes in climate in the future can have similar effects on the evolution of future life. Directly prior to this unit, students investigated the properties of the atmosphere. Students were introduced to the greenhouse effect and how it may change atmospheric composition due to human activities. Students will use the concepts presented in this unit to evaluate resource usage in the next unit.
Essential Question(s): 1. **What is the major difference between weather and climate?** 2. **What properties determine an area's climate?** 3. **What is the relationship between climate and biodiversity of an area?** 4. **How can climate be disrupted by human activities?**	**Enduring Understanding(s):** 1. Earth's weather and climate systems are the results of complex interactions between the land, oceans, ice, and atmosphere. Climate is determined by energy transfer from the Sun at and near Earth's surface. This energy transfer is influenced by dynamic processes, such as cloud cover and Earth's rotation, as well as static conditions, such as proximity to mountain ranges and the ocean. Human activities, such as the burning of fossil fuels, also affect the global climate. 2. The Earth's composition is unique, is related to our place in the solar system, and provides us with the raw resources needed to sustain life. Earth's radiation budget varies globally, but is balanced providing the basic

	amounts of sunlight, temperature, and precipitation that determine climate. 3. All animals and plants depend on each other and the environment to meet basic needs. Students must analyze the interrelationships and interdependencies among different organisms, and explain how these relationships contribute to the stability of the ecosystem. 4. Stability in an ecosystem can be disrupted by natural or human interaction. Model how natural and human-made changes in the environment will affect individual organisms and the dynamics of populations. 4. The biogeochemical cycles on Earth create a flow of resources through the hydrosphere, geosphere, atmosphere, and biosphere. The biogeochemical cycles are governed by the earth's external and internal sources of energy. These cycles are impacted and disrupted by human activity. Earth's hydrologic cycle is complex and varies globally, regionally, and locally.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable <u>Learning Target</u>	<u>NJCCCS or CCS</u>
1. Compare and contrast weather and climate **2. Identify the important characteristics of climate including temperature and precipitations.** **3. Explain how latitude and other factors affect the climate of an area.** **4. Explain how bodies of water and land formations can affect the climate of an area.** **5. Describe the rain shadow effect and its effect on ecosystems.** **6. Describe the heat island effect and investigate methods of reduction.** **7. Compare and contrast terrestrial biomes.** **8. Describe how organisms adapt to the particular climate of a biome.** **9. Describe the impact of human activities on terrestrial biomes.** **10. Identify the major processes involved in the carbon cycle.** **11. Describe the impact of human activities on climate.** **12. Explore the possible caused of climate change.** **13. Evaluate the effects of climate change and methods to minimize these effects.**	**1. Science: 5.4 F 1-3 Other content standards:** 6.1.12.B.6, 6.1.12.D.6, 6.1.12.C.12, 6.1.12.B.16, 6.1.12.C.16, 6.2.12.C.3, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, F.6, 9.4O RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **2. Science: 5.4 F 1-3** **3. Science: 5.4 F 1-3** **4. Science: 5.4 F 1-3 5.** **5. Science: 5.4 F 1-3** **6. Science: 5.4 F 1-3** **7. Science: 5.3 C 1-2, E-4 Other content**

	standards:2.2.12.B.1, 6.1.12.B.6, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.B.16, 6.1.12.C.16, 6.2.12.C.3, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.1.12.F.6,9.4O, ST.910.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5,9,10,S-ID.1, WHST.910.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **8. Science: 5.3 E-4** **9. Science: 5.3 C 2 5.4 G 2-7 Other content standards:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.13, 6.1.12.B.16, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **10. Science: 5.4 G-2-7** **11. Science: 5.3 C-1,2 5.4 G 2-7** **12. Science: 5.4 F-2** **13. Science: 5.3 C-1,2 5.4 G 2-7**

Inter-Disciplinary Connections:

Material in this section will connect with material in Math, History, and Language Arts. Students will need to analyze quantitative data, graphs, and draw conclusions. Students will need to read maps and identify important features on the globe. Students will also need to discuss how social and economic activity may contribute to environmental issues and solutions. Students will also use written resources to research biome characteristics, as well as, read articles from periodicals developing an opinion on environmental issues of

climate change. Students will develop public speaking skills through presentations.

Examples:
Terrestrial Biome Research Project – Students will use research resources such as Facts on File: Science Online to research a particular biome and create a power point presentation to educate classmates.

Students will read various articles discussing the climate change issue and evidence.

Climate Change Proposal – Students will develop a proposal as part of the NJ DEP position on methods to reduce activities which contribute to climate change.

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Students will engage with the following text:

Textbook – Earth Science Glencoe Ch 14, Use various research resources such as Facts on File: Science Online, Periodic Articles such as, "US to Suffer Most from Future Sea Rise"
- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder **Accommodations/Modifications:**
Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to : photocopy pages in textbook and give to students prior to reading assignment in the classroom so they can pre-read, highlight, ask questions, and then re-read materials, highlight or underline main ideas in reading materials, provide guiding questions to complete when reading, "US to Suffer Most from Future Sea Rise" to ensure an understanding of key concepts; discuss answers to questions when complete to assess comprehension of all students after reading each periodic article, provide students with summary of each periodic article.

Students will write:

Students will use Cornell note taking strategies, write written responses to warm up questions, create and present a power point presentation by reading, summarizing, and analyzing various research resources, and write a climate change proposal. Students will also in a paragraph summarize events that occur in the carbon cycle and identify processes that add and subtract carbon dioxide from the atmosphere.

Example: Lab Activity - Carbon Cycle Diagram

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder **Accommodations/Modifications:**
Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: provide student with paper set up in Cornell notes

format when taking notes, provide students with written copy of notes or guided notes, writing prompts when answering critical thinking questions, verbally explain carbon cycle and movement of carbon throughout atmosphere, show carbon cycle illustration before summarizing events, list events of carbon cycle to summarize and have students place them appropriately in carbon cycle using arrows to show movement of carbon, reduce amount of writing .

For Carbon Cycle Diagram – change number three to "list steps of the carbon cycle", do not require students to write a paragraph that explains the steps, change rubric to match.

For Climate Change Proposal – change the amount of information required in assignment from ten to eight (prov fossil fuels and what we use them for), read guidelines out loud and show/discuss grading rubric at the same time.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

<u>How</u> will students uncover content and build skills.

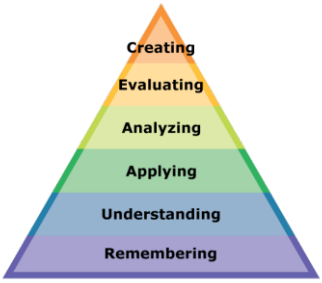
- Students will be presented with information through power point presentation which will utilize multimedia videos and interactive maps and diagrams.
- Students will investigate concepts through guided class discussion lead by teacher based questions.
- Students will record, analyze, track, and make predictions of local weather.
- Small group discussion as students work in groups to perform research and develop
- proposals.
- Student lead instruction as in the case of biome presentations
  Be provided with real world relevance and current environmental issues regarding climate
- change.

The students will reinforce concepts by completing a graphic visual such as with the carbon cycle.

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

Students will demonstrate understanding through responses to class discussion, warm up questions, quizzes, and level of difficulty when completing class work activities.

Example:

Climate Quiz – Remembering & Understanding (vocabulary), Applying & Analyzing (diagram completion & free response question)

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.
Climate Quiz – study guide provided before the quiz, student may choose three open ended questions instead of four.

Summative Assessments:

Students will demonstrate mastery of unit content and concepts through completing lab activities, research projects, and unit exams.

Example:

Terrestrial Biome Power Point Presentation – R,U,Ap,An,E,C
Carbon Cycle Diagram – R,U,Ap,An,E,C
Climate Change Proposal – R,U,Ap,An,E,C
Climate Change Test – R,U,Ap,An,E

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.
Carbon Cycle Diagram – change number three to "list steps of the carbon cycle"; do not require students to write a paragraph that explains the steps, change rubric to match.
Climate Change Proposal – change the amount of information required in the assignment from ten to eight (provide a list of fossil fuels and what we use them for), read guidelines out loud and show/discuss grading rubric at the same time.

Climate Change Test – reword #21, delete #22, limit multiple choice answers from five to four, student may choose to answer two of the four open ended questions, allow two class periods to complete the test if needed, offer oral reading/rewording of test questions.

Performance Assessments:

Students will demonstrate mastery of performance skills through completion of lab activities and research projects.

Example:

Terrestrial Biome Power Point Presentation – R,U,Ap,An,E,C

Carbon Cycle Diagram – R,U,Ap,An,E,C

Climate Change Proposal – R,U,Ap,An,E,C

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs.

Biome Power Point Presentation – Group students by academic needs; provide a list of biome choices. Carbon Cycle Diagram – change number three to "list steps of the carbon cycle", do not require students to write a paragraph that explains the steps, change rubric to match.

Climate Change Proposal – change the amount of information required in assignment from ten to eight (provide a list of fossil fuels and what we use them for), read guidelines out loud and show/discuss grading rubric at the same time.

Black Horse Pike Regional School District

Environmental Science Curriculum

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Unit 6: Energy Resources

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Environmental Science/ Energy Resources** **Grade Level(s):** **9-12**	**Unit Summary**: This unit will explore the energy resources available for human usage and the pros and cons of using each of these resources. There are three categories of energy resources, non-renewable, renewable and inexhaustible. Each of these energy resources, with the exception of geothermal energy, originally gets its energy from the sun. The students will develop an understanding that energy is transformed from solar energy into the different types of energy that they experience in their lives. The unit will begin with a discussion about non-renewable energy resources, fossil fuels and nuclear power, and their pros and cons. Fossil fuels are the predominant energy resource used by humans because they are capable of producing energy at a relatively low cost despite time of year or location and are easily transported. However, they take millions of years to form and contribute to air and water pollution and are contributors to climate change. Nuclear power is also relatively inexpensive to produce and can be used despite external conditions. Nuclear power also has the added advantage of not contributing to air pollution. However, it also contributes to water pollution in the form of thermal pollution, involves the production of radioactive waste that must be stored for thousands of years and involves the risk of power plant melt downs. The unit will then shift focus to renewable and inexhaustible energy resources. Renewable energy resources are also referred to as biomass. Inexhaustible energy resources include wind power, hydropower, geothermal energy and solar energy. The pros and cons of using each of these resources will be explored. Students will be responsible for creating a project that educates people about one of these energy resources. This unit has connections to the previous units on Astronomy, Earth's history, and plate tectonics. Concepts introduced in this unit, such as the carbon cycle and air and water pollution, will be further developed the units on atmosphere, climate, land and water resources.
Essential Question(s): 1. How is energy from the Sun transferred and transformed within Earth's spheres? 2. How do geologic events occurring today provide insight into Earth's	**Enduring Understanding(s):** 1. Most of the energy that we use today originally comes from the sun and is converted into different forms. 2. Fossil fuels form from the decay of organisms that lived millions of years ago. It takes millions of years for them to form from Earth's processes and we will eventually run out if we continue to consume

past? 3. Is it possible for humans to influence a system as large as climate? 4. To what extent can human behaviors impact our planet's life support system (environment)?	3. them at the current rate. Using fossil fuels contributes to air and water pollution and climate 4. change. Nuclear power is a relatively cheap alternative to using fossil fuels but it 4. has possible dangerous consequences. Biomass resources such as wood and ethanol are renewable energy resources that can be used as alternatives to fossil fuels. However, they contribute to air pollution and can have negative implications for food prices. 4. Solar power, wind power, geothermal energy and hydroelectric power are all inexhaustible energy resources that do not contribute to air or water pollution. However, they are not available in all locations or at all times and there are drawbacks to using each of these resources.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Identify the 5 types of energy 2. State the law of conservation of energy 3. Describe how energy from the sun is converted into each of the different forms of energy 4. Identify examples of nonrenewable energy resources 5. Describe the advantages and disadvantages of using fossil fuels 6. Explain the advantages and disadvantages of using nuclear energy 7. Compare and contrast inexhaustible and renewable energy resources 8. Describe the advantages and disadvantages of using biomass as an energy resource 9. Describe the advantages of using solar energy, wind energy, geothermal energy, and hydropower 10. Explain why inexhaustible and renewable resources are used less than nonrenewable resources 11. Use desktop publishing programs to create a product that educates the public about alternatives to fossil fuels. 12. Compare and contrast the affect of using of fossil fuels and alternative energy resources on the carbon cycle and global climate.	**1. Science:** 5.1 A 1-3, 5.1 D 1-2, 5.4 E 1 **Other Content Areas:** 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **2. Science:** 5.4 E 1 **Other Content Areas:** 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5,

	9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **3. Science:** 5.4 E 1 **Other Content Areas:** 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **4. Science:** 5.4 G 5-7 **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **5. Science:** 5.3 C2, 5.4 E 3, 5.4 G 3-7 **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **6. Science:** 5.2 D 4, 5.3

	C 2, 5.4 G 3-7 **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **7. Science:** 5.4 G 3-7 **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **8**. **Science:** 5.3 C 2, 5.4 E 3, 5.4 G 3-7 **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **9. Science:** 5.3 C 2, 5.4

	E 3, 5.4 G 3-7 **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **10. Science:** 5.3 C 2, 5.4 E 2-3, 5.4 G 5-7 **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **11. Science:** 5.3 C 2, 5.4 E 3, 5.4 G 3-7 **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10

	12. Science: 5.4 G 1-7 **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, History, Language Arts and 21 Century Skills. Students will be analyzing graphs, discussing environmental implications of societal practices, writing responses to open ended/ essay questions and creating a desktop publication.

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Students will engage with the following text:

Earth Science, Glencoe Ch 26-27
"Energy Kids Page" Energy Information Administration. November 2007.
http://www.eia.gov/kids/energy.cfm?page=biomass_home-basics-k.cfm

Examples:
Nonrenewable energy resources pre-reading
Carbon Foot print Lab
Alternative energy research project

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: photocopy pages in textbook and give students reading materials in advance so they can pre-read, highlight, ask questions, and then re-read materials in class, provide guiding questions to complete when reading to ensure understanding of key concepts, discuss answers to questions when complete to ensure comprehension of all students upon completion of reading, provide students with summaries.

For Non-renewable Energy Resources: allow students to work in pairs, grouping by academic strengths and weaknesses, reduce numbers of questions to one for all boxes, photocopy and highlight key information corresponding with questions from page 689 to reduce the amount of reading.

Students will write:

Students will use Cornell note taking strategies, write responses to open ended/essay questions, and create a desktop publication.

Examples:

Renewable/Inexhaustible Energy Project

Who killed the electric car? computer lab

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: writing prompts when answering critical thinking questions, reduce amount of writing, provide students with paper set up in Cornell notes format when taking notes, provide students with guided notes or copies of notes, give graphic organizers and time lines to help students organize concepts when applicable, reduce length requirements for writing assignments, reduce number of open-ended responses, grade content not spelling/grammar/mechanics when grading written assessments.

For Renewable/Inexhaustible Energy Project: pair students by academic strengths and weaknesses, give choice of giving notes or visuals (do not require both), do not require students to create a test (modified guidelines on TC shared, science, Sedgwick 2012 environmental curriculum).

For Electric Cars: A Computer Lab: do not require students to answer in complete sentences, watch the preview for the movie in class rather than viewing it on individual computers, discuss preview of movie concepts discussed, costs/benefits of electric cars, and alternative fuels before questions are answered independently, partner weak writers to work with stronger ones.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

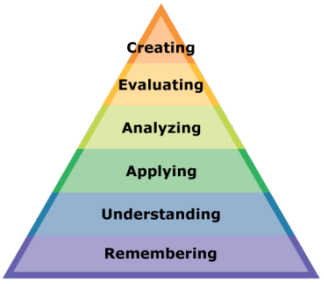
How will students uncover content and build skills.

- Students will be presented with material through text based readings, demonstrations and multimedia presentations utilizing, PowerPoint, videos and the internet.
- Students will work with/ investigate concepts through: o Individual research pertaining to an inexhaustible energy resource.
  o Inquiry activities pertaining to the carbon cycle.
- The teacher will guide whole class and small group discussions by monitoring student input and asking question to elicit student prior knowledge and expand conversation, and provide concrete examples to emphasize real world relevance.
- The students might reinforce concepts by analyzing their own personal energy use and designing and implementing a plan to conserve energy in their daily lives.
- The students might expand upon concepts by reading articles or visiting webpages that explore "green" technologies that are constantly being developed or investigating the energy resource options in their area.

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



<u>Formative Assessments</u>:

Formative assessments will be in the form of homework assignments, periodic quizzes, text based questions and writing assignments.

Example:

Fossil fuel quiz- (Understanding)
Coal formation worksheet- (Analyzing)
Alternative energy research- (Analyzing)
Carbon footprint lab- (Evaluating)

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

<u>Accommodations/Modifications</u>:

Accommodations and, or modifications will be made on a case by case basis in accordance with individual student needs.

<u>Fossil Fuel Quiz</u>: do not require student to change the bolded word or words to make the statements true,
<u>Coal formation worksheet</u>: read and fill in answers together as a class recording correct responses on Smart Board or white board, increase space between questions and print size
<u>Carbon footprint</u> – use pair and share techniques
<u>Alternative energy –</u> provide user friendly web sites and reduce the number of questions

Summative Assessments:

Students will be required to take a test(s) to demonstrate proficiency on the material presented in this unit.

Example: Test nonrenewable resources – (Evaluating)

Test renewable and inexhaustible energy resources- (Creating)

Test energy resources- (Evaluating)

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and, or modifications will be made on a case by case basis in accordance with individual student needs.

ADDED TIME, Split Unit into two tests (renewable/inexhaustible and nonrenewable), read test orally, provide options for open ended split unit tests into two tests (renewable/inexhaustible and nonrenewable), read test questions out loud and restate/reword when needed, give extra time to finish test,

Test: Nonrenewable Energy Resources: do not require student to correct the italicized word to make each statement read true (give extra credit if corrections are made), reduce number of multiple choice options, require students to answer two of three open ended questions (give all three and allow students to choose), list processes for number #18 to help guide drawing of carbon cycle.

Test: Inexhaustible Energy: reduce number of multiple choice options, chunk fill in the blank into two separate word banks and sections, for open ended question: list all five alternative energy sources, provide a map of high school campus,

Test: Earth's Energy Resources: allow students to write directly on unit test instead of using scantron, chunk matching section (part 1) into three sections of four terms each, reduce number of multiple choice options, and list all energy resources for open ended question for student to choose from.

Performance Assessments:

Students will be required to turn in homework, perform labs and work on small group assignments based on the material in this unit.

Example:

Renewable/inexhaustible project

Teaching project- (Create)

Informational power point- (Create)

Carbon footprint project- (Create)

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and, or modifications will be made on a case by case basis in accordance with individual student needs.

Alter grading rubric (example decrease value of spelling/grammar/punctuation for dyslexic students), demonstrate features of desk top publishing programs, work with students individually give students extra time to complete project, work with students individually, assess comprehension and progress of students throughout completion of projects,

Inexhaustible Energy Resources Brochure Project: review all energy resources and assess comprehension of students before allowing them a choice, demonstrate features of desktop publishing programs, do not require student to research #5, grade content not grammar/mechanics/spelling,

Renewable/Inexhaustible Energy Project: pair students by academic strengths and weaknesses, give choice of giving notes or visuals (do not require both), do not require students to create test,

Carbon footprint Project: pair students academically, include guideline sheet to help prompt creation of student's own carbon footprint.

Black Horse Pike Regional School District

Environmental Science Curriculum

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Unit 7: Our Impact on Land

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Environmental Science/ Our Impact on Land** **Grade Level(s):** **9-12**	**Unit Summary**: This unit will explore land as a natural resource and the impact of the growing human population on land. The unit will begin with a discussion of carrying capacity and the variety of ways in which humans utilize land. Connections will be drawn to the climate unit and the energy resources unit previously covered. The consequences of land usage by humans such as effects on micro climates, habitat destruction and ground water pollution will then be looked into. The students will research the GEMS landfill and create a web-quest designed to educate other students about the local impact of our land usage. The effects of land usage on ground water will be further developed in a unit on freshwater resources. The unit will end with a focus on preventative measures that can be taken to circumvent the negative effects of land usage and the remedies that have been developed to combat these negative effects once they have already occurred.
Essential Question(s): 1. Is there a limit to the number of people that can live on the Earth at one time? 2. To what extent can human behaviors impact our planet's life support system (environment)? 3. Why is it important to think in terms of systems of systems when considering environmental issues? 4. How do humans impact the diversity and stability of ecosystems? 5. Land is often overlooked as a natural resource. Why is land valuable resource? 6. What is meant by the statement "the Earth	**Enduring Understanding(s):** 1. Human activities have physical, chemical, and biological consequences for ecosystems; the magnitude of the impact depends in part on the sensitivity of the system to perturbation. 1. Advances in technology have increased the birth rate and average life span of humans which in turn has caused an increase in the rate of growth of the human population. 2. Organisms and their environments are interconnected. Humans can alter the living and non-living factors within an ecosystem, thereby creating changes in the overall system. 3. Ecosystems are the result of the interactions among Earth's biosphere, geosphere, atmosphere, and hydrosphere. 4. Humans have the ability to prevent and remedy the pollution caused by their usage of land. Some sources of pollution are more easily controlled and treated than others. 5. Land is a limited resource that is necessary for life sustaining activities. 6. The Earth's natural resources exist in fixed quantities and are recycled

recycles?”	through natural processes.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Explain what happens as we approach carrying capacity. 2. Evaluate the historical influence of modern medical technology, sanitation and agricultural practices on the rate of growth of the human population since 1800. 3. Explain why land is a valuable natural resource by listing the different ways that humans use land. 4. Describe the negative impacts that different uses of land by humans can have on the environment. 5. Describe and evaluate methods that can be used to prevent and remedy pollution caused by different uses of land by humans. 6. Explain the advantages of recycling. 7. Select ways to conserve resources.	**1. Science:** 5.4 G 2 **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.13, 6.1.12.B.16, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **2. Science:** 5.4 G 6 **Other Content Areas:** 2.2.12.B.1, 6.1.12.D.6, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.3, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **3. Science:** 5.4 G (5-6) **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7,

	9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **4. Science:** 5.3 C2**,** 5.4 G (5-7) **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **5. Science:** 5.4 G (1, 2, 5-7) **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **6. Science:** 5.4 G (1, 2, 5-7) **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16,

	6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **7. Science:** 5.4 G (1, 2, 5-7) **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, History, and Language Arts. Students will be analyzing graphs, discussing how scientific and societal changes have affected the growth of the human population, and performing calculations to predict how large the human population will be in the future.

Examples:

- Think/ Pair/ Share – Look at the graph on page 715 of the text (Earth Science, Glenco). What happened to the rate of population growth after 1350? Why do you think this occurred?
- Lab "A World Full of People"
- Reinforcement worksheet- Predicting Population Growth
- Interactive maps as part of multimedia presentations o

  http://www.pbs.org/wgbh/nova/earth/global-population-growth.html o

  http://www.pbs.org/wgbh/nova/earth/earth-peril.html

- examples of strategies and modified strategies are in the District/Shared/Science folder

Students will engage with the following text:

Earth Science, Glenco Ch 27

Examples: Group Work/ Discussion pages 710 through 729

- examples of strategies and modified strategies are in the District/Shared/Science folder **Accommodations/Modifications:**

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: photocopy pages in textbook and give students reading materials in advance so they can pre-read, highlight, ask questions, and then re-read materials in class, highlight or underline main ideas in reading materials, provide guiding questions to complete when reading to ensure understanding of key concepts, discuss answers to questions when complete to assess comprehension of all students upon completion of reading, provide students with summaries,

Group Work/Discussion: group stronger and weaker readers together, reduce length of reading material, highlight the most important concepts in each section to reduce length or rewrite a condensed version, provide guiding questions for the group to answer together as they read out loud, discuss answers to questions out loud and record correct answers on the Smart Board or white board and then give typed copy of responses, have students write summaries as a group and then type all summaries and give copies to students.

Students will write:

Students will use Cornell note taking strategies, write written responses to warm up questions and conclude and apply questions in labs.

Examples: Believe it or not activity (warm up/follow up formative assessment)
Lab "A World Full of People"

- examples of strategies and modified strategies are in the District/Shared/Science folder **Accommodations/Modifications:**

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: writing prompts when answering critical thinking questions, reduce amount of writing, provide students with paper set up in Cornell notes format when taking notes, provide students with guided notes or copies of notes, give graphic organizers and time lines to help student organize concepts when applicable, reduce length requirements for writing assignments, reduce number of open-ended responses, grade content not spelling/grammar/mechanics when grading written assessments.

For Land Usage Believe It or Not Engage Activity: group stronger and weaker readers together when assigning groups, give weaker readers shorter statements.

For A World Full of People Lab: give students five minutes to answer pre-lab questions after reading lab procedure out loud together, reduce number of popcorn kernels to add to map (9.5 kernels or beans = 95 million instead of 95 kernels or beans = 95 million), increase time representing one year (three minutes instead of one), answer all conclude and apply questions in small groups with teacher circulation or as a class with answers being recorded on Smart Board or white board.

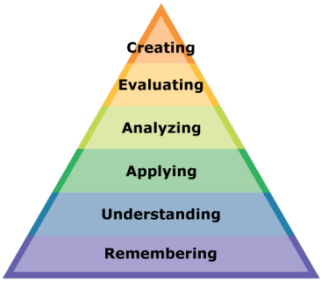
For Hazardous Waste Concept Map: Read directions out loud at the beginning of the lab, have students cut and paste terms from word bank instead of writing them in boxes, complete concept map in small groups grouping academically stronger and weaker students together, go over all answers to concept map together out loud when lab is complete with teacher or student recording correct answers on Smart Board or white board, give copies of typed concept map to students

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

- Students will be presented with material through multi-media presentations utilizing PowerPoint, videos and interactive maps, text based readings and analysis of graphs.
- Students will work with/ investigate concepts through:
  - Whole class and small group discussions about land usage and conservation of resources
  - Lab activities pertaining to population growth, carrying capacity and waste disposal
- The teacher will guide whole class and small group discussions by monitoring student input and asking question to elicit student prior knowledge and expand conversation, and provide concrete examples to emphasize real world relevance.
- The students might reinforce concepts by completing graphic organizers or creating posters demonstrating ways that the negative impact of land usage by humans can be decreased.
- The students might expand upon concepts by visiting http://www.pbs.org/wgbh/nova/earth/earthperil.html and accessing the interactive maps.
  - examples of strategies and modified strategies are in the District/Shared/Science folder



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS. Formative Assessments:

Formative assessments will be in the form of oral question and answer, periodic quizzes, text based questions, group work and lab extension questions.

Example: Believe it or not activity (warm up/ follow up formative assessment)– Evaluating
Quiz "Carrying Capacity and Population" - Analyzing
Hazardous Waste Concept map- Analyzing
Reinforcement worksheet- Predicting Population Growth

- examples of assessments and modified assessments are in the District/Shared/Science folder

Accommodations/Modifications:

Accommodations and, or modifications will be made on a case by case basis in accordance with individual student needs.
ADDED TIME / provide formula or examples for performing calculations, bold key words in text based questions
Land Usage Believe It or Not Engage Activity: group stronger and weaker readers together when assigning groups, give weaker readers shorter statements,

Carrying Capacity and Population Quiz: #1 List two reasons instead of three, #2 give definition of carrying capacity, add labeled y axis, replace graph using data points instead of human bodies, #8 re-word question to read," What is the difference between each year increment on the x axis?"

Hazardous Waste Concept Map: Read directions out loud at the beginning of the lab, have students cut and paste terms from word bank instead of writing them in boxes, complete concept map in small groups grouping academically stronger and weaker students together, go over all answers to concept map together out loud when lab is complete with teacher or student recording correct answers on Smart Board or white board, give copies of typed concept map to students,

Predicting Population Growth: Read the bullets at the top of worksheet out loud as a class, have students answer questions in groups rather than individually, record group responses on one worksheet instead of individual, review percentage proportions before completion of #3, review group responses together out loud as a class with correct answers recorded on Smart Board or white board.

Summative Assessments:

Students will be required to take a test to demonstrate proficiency on the material presented in this unit.

Example: Our Impact on Land Test –Evaluate

- examples of assessments and modified assessments are in the District/Shared/Science folder

Accommodations/Modifications:

Accommodations and, or modifications will be made on a case by case basis in accordance with individual student needs.

ADDED TIME/ word bank/ reduce number of multiple choice options/ choose one for open ended instead of doing all/ give test orally/ reword questions

Our Impact on Land Test: allow students to record answers directly onto the test instead of answer key, reduce number of choices from four to three in multiple choice section, reduce sections of outline from three to two in part III, add labeled y axis and use data points instead of human figures on graph, delete # 25, reduce open ended questions from three to two in part V, take out required math calculation in # 26

Performance Assessments:

Students will be required to turn in homework and perform labs and work on small group assignments based on the material in this unit.

Example: Land Usage Poster – (Create)

Reclamation mini lab –Page 718

S:\Staff\Science\curriculum writing project ES\Our Impact on Land Examples

- examples of assessments and modified assessments are in the District/Shared/Science folder

Accommodations/Modifications:

Accommodations and, or modifications will be made on a case by case basis in accordance with individual student needs.
Reword questions/ work with students one on one – What happens to trash lab
Modify grading rubric on an individual basis/ provide graphic organizer to help visualize ideas
Land Usage Poster Project: group by academic strengths and weaknesses, provide copy of written notes to provide information needed, provide graph paper and art supplies for project, give class time to work in groups on poster, provide graphic organizers to help visualize ideas, show example poster, extended time to complete the poster, modify grading rubric on an individual/group basis, offer after school assistance in the LMC to research requirements using the internet.
Reclamation mini lab - group by academic strengths and weaknesses, provide notes to assist in answering questions

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Unit 8: Our Impact on Water

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Environmental Science/ Water Resources** **Grade Level(s):** **9-12**	**Unit Summary**: This unit will explore the impact of human activity on the Earth's water resources. It will connect to the previous units on our impact on land, climate and energy resources, and demonstrate the interconnectedness of the Earth's spheres and geochemical cycles. The unit will begin with a discussion about the importance of the Earth's fresh water resources. The focus will then shift to how much of the Earth's water is usable fresh water as opposed to salt water and where usable water can be found. The Earth's hydrologic cycle will be analyzed. Students will explore ways in which humans affect the hydrologic cycle. Humans can cause water pollution both directly and indirectly as a result of air pollution and land usage. This examination of the hydrologic cycle will bring into focus the interconnectedness of the hydrosphere, atmosphere and geosphere. Students will come to an understanding that human activities that affect the water cycle also impact surrounding ecosystems due to the interconnectedness of the Earth's spheres. The unit will culminate with a discussion about personal water usage and what each individual can do at home to conserve water and prevent water pollution.
Essential Question(s): 1. Over 70% of the earth is comprised of water. Why do we need to conserve it? 2. What are some ways in which the Earth recycles? 3. Why is it important to think in terms of systems of systems when considering environmental issues? 4. To what extent can human behaviors impact our planet's life support system (environment)? 5. How do humans impact	**Enduring Understanding(s):** 1. Although Earth is over 70% water only a limited amount is usable fresh water. 2. The water that is present on the Earth today is the same water that was here when dinosaurs roamed the Earth. Nature constantly filters and recycles water through the Earth's hydrologic cycle. 3. Ecosystems are the result of the interactions among Earth's biosphere, geosphere, atmosphere, and hydrosphere. Changes in one part of the system will affect other parts of the system. 4. Human activities have physical, chemical, and biological consequences for ecosystems; the magnitude of the impact depends in part on the sensitivity of the system. 5. Organisms and their environments are interconnected. Humans can alter the living and non-living factors within an ecosystem,

natural geochemical cycles?	thereby creating changes in the overall system.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Identify reasons why fresh water is important for life. 2. Compare the amount of water on the planet to the amount of usable water available. 3. Use the hydrologic cycle to explain why the water we use today is the same water that has been used since Dinosaurs roamed the Earth. 4. Identify types of water pollution and their effects. 5. Categorize pollution sources as point source or non point source pollution. 6. List and discuss ways to reduce water pollution. 7. Develop a plan to clean up a polluted body of fresh water and prevent it from becoming polluted again in the future. 8. Calculate water use footprint and select ways to conserve water on a daily basis.	**1. Science:** 5.4 G 4, 7 **Other Content Areas:** 2.2.12.B.1, 6.1.12.D.6, 6.1.12.C.12, 6.1.12.B.16, 6.1.12.C.16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **2. Science:** 5.4 G 4, 7 **Other Content Areas:** 2.2.12.B.1, 6.1.12.D.6, 6.1.12.C.12, 6.1.12.B.16, 6.1.12.C.16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **3. Science:** 5.4 G 7 **Other Content Areas:** 6.1.12.D.6, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-

	10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **4. Science:** 5.4 C 1-2, 5.4 G 2 **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.13, 6.1.12.B.16, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **5. Science:** 5.3 C 2, 5.4 G (1-5) **Other Content Areas:** 2.2.12.B.1, 6.1.12.B.6, 6.1.12.B.9, 6.1.12.C.12, 6.1.12.C.13, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **6. Science:** 5.4 C1, 5.4 G 1-2, 5.4 G 4-7 **Other Content Areas:**

	6.1.12.D.6, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 **7. Science:** 5.4 C 1, 5.4 G 1-2,5.4 G 4-7 **Other Content Areas:** 6.1.12.D.6, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7. 1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10 8. **Science:** 5.4 C1, 5.4 G 1-2, 5.4 G 4-7 **Other Content Areas:** 6.1.12.D.6, 6.1.12.C.12, 6.1.12.C16, 6.2.12.C.5, 7.1.IL.A.7, 9.1.12.A.1, 9.1.12.B, 9.4O, RST.9-10.1, 2, 3, 4, 5, 9, 10 OR RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.9-10.1, 2, 3, 4, 5, 9, 10 OR WHST.11-12.1, 2, 3, 4, 5, 9, 10

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, History, and Language Arts. Students will be calculating percentages and creating and analyzing graphs, discussing environmental implications of societal practices and political decisions, and writing responses to open ended/ essay questions.

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Students will engage with the following text:

Earth Science, Glenco pp669-675 & 730-735
www.grinningplanet.com- water pollution article series

Examples:
www.grinningplanet.com – water pollution article series group activity
Water pollution lab – pp 734-735

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder **Accommodations/Modifications:**
Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: photocopy pages in textbook and give students reading materials in advance so they can pre-read, highlight, ask questions, and then re-read materials in class, highlight or underline main ideas in reading materials, provide guiding questions to complete when reading to ensure understanding of key concepts, discuss answers to questions when complete to assess comprehension of all students upon completion of reading, provide students with summaries, when assigning independent reading pair weaker readers with strong.
Grinning Planet Water Pollution Articles Series Group Activity: on the first day group stronger readers with weaker ones, have a strong reader read the article out loud to other group members, assess comprehension of entire group before moving assigning letters on the second day.
Water pollution lab: read section out loud to entire class and assess comprehension by asking oral questions and discussing answers before independent completion of lab activity, after completion go over all answers together as a class and record correct responses on Smart Board or white board.

Students will write:

Students will use Cornell note taking strategies, write responses to open ended/essay questions, perform calculations involving percentages.

Examples:
Water Pollution Lab
Water Resources Bingo

- examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications: Accommodations and/or modifications will be made on a case by case basis in accordance with individual student needs. These may include but not be limited to: writing prompts when answering critical thinking questions, reduce amount of writing, provide students with paper set up in Cornell notes format when taking notes, provide students with guided notes or copies of notes, give graphic organizers and time lines to help students organize concepts when applicable, reduce length of requirements for writing assignments, reduce number of open ended responses, grade content not spelling/grammar/mechanics when grading written assessments.

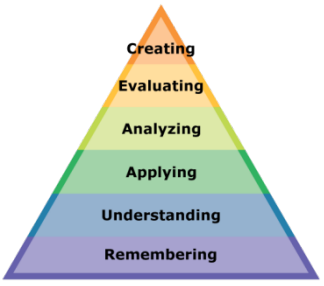
Water Pollution Lab: read the Background Material out loud and assess comprehension of all students prior to individual completion, do not deduct points if answers are not in complete sentences, discuss strategies before required answering questions. (modified lab)
Water Resources Bingo: Write a list of terms from unit for students to choose from when creating their own water bingo sheet, provide free space in the center of the board, allow four corners.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

- Students will be presented with material through text based readings, demonstrations and multimedia presentations utilizing, PowerPoint and videos.
- Students will work with/ investigate concepts through:
  - Whole class and small group discussions about water resources, water pollution and water conservation.
  - Lab activities pertaining to water pollution.
- The teacher will guide whole class and small group discussions by monitoring student input and asking question to elicit student prior knowledge and expand conversation, and provide concrete examples to emphasize real world relevance.
- The students might reinforce concepts by completing graphic organizers or creating posters to educate people about personal water conservation.
- The students might expand upon concepts by visiting web sites aimed at water conservation and pollution education such as http://www.epa.gov/gateway/science/water.html , or http://www.watereducation.org/doc.asp?id=1022.
  - examples of strategies and modified strategies are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder



PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of homework assignments, periodic quizzes, text based questions and writing assignments.

Example:

Water Resources Bingo- Analyzing

Water Cycle Quiz- Analyzing

- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and, or modifications will be made on a case by case basis in accordance with individual student needs.
Water Cycle Quiz: extended time, provide diagram of water cycle with words deleted to help jog memory, provide multiple choice options, read questions out loud and reword if necessary, provide diagram of nitrogen, carbon, and rock cycle to guide student when answering number five,
Water Resources Bingo: Write a list of terms from unit for students to choose from when creating their own water bingo sheet, provide free space in the center of the board, allow four corners.

Summative Assessments:

Students will be required to take a test to demonstrate proficiency on the material presented in this unit.
Example: Test "Our Impact on Water" - Evaluating
- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and, or modifications will be made on a case by case basis in accordance with individual student needs.
ADDED TIME - PERFORMANCE ASSESSMENT INSTEAD OF MC - CONCEPTUAL BASED ASSIGNMENTS - STUDENT CHOICE FROM LIST OF POSSIBILITIES
Our Impact on Water test: allow students to write on assessment instead of recording answers on scantron sheet, be sure that all multiple choice options fit on the page and do not run onto the next, read out loud and reword test questions if needed, give word bank with options to complete the chart for # 18-20, provide diagram of nitrogen cycle, carbon, or rock cycle to help guide response to # 21, reduce number of examples required for # 22, do not require student to answer, "What is the land near this lake likely used for?" under #23, reduce required open ended from three to two questions, performance assessments instead of multiple choice, conceptual based assignments, student choice from list of possibilities.

Performance Assessments:

Students will be required to turn in homework, perform labs and work on small group assignments based on the material in this unit.
Example:
Water Pollution Lab- Creating
Personal Water Use Conservation Group Activity- Creating
- examples of assessments and modified assessments are in the District Shared\Science\CURRICULUM WRITING 2012\Environmental Science folder

Accommodations/Modifications:

Accommodations and, or modifications will be made on a case by case basis in accordance with individual student needs.

Water Use Conservation Group Activity: Group students by academic strengths and weaknesses, record all student responses on white board or Smart Board, reduce number of categories under #6, assist with multiplication to find total amount of water used per activity,

Water Pollution Lab: group students of different ability levels and assign specific tasks to each based on individual strengths.

Black Horse Pike Regional School District

Highland Timber Creek Triton

Special Education Department

Environmental Science Syllabus

Course Content

Earth operates as a set of complex, dynamic, and interconnected systems, and is a part of the all encompassing system of the universe. In this course, students will learn about the Earth's place in the Universe as well as the processes that continue to shape it. They will be better prepared to make choices about how to use and conserve the earth's resources. Through reading, writing, discussion, and lab work, students will study the structure of the earth's surface, atmosphere and oceans. This course prepares students for a summative assessment unifying the following themes and objectives (with state standards).

September: A.) Astronomy (5.1.12.A.1-D.3; 5.4.12.A.1-6)

- Cite evidence for the origin of the universe according to the Big Bang theory
- Explain the formation of galaxies, star and planets
- Describe the structure of our solar system

October/November: B.)Earth's History (5.1.12.A.1-D.3; 5.4.12.B.1-3)

- Trace the evolution of the Earth's surface, atmosphere and oceans, and life forms
- Correlate rock strata using index fossils and other relative dating
- techniques Account for the evolution of species using absolute-dating of
- fossils Describe changes the Earth undergoes as a result of natural processes.

December: C.) Plate Tectonics (5.1.12.A.1-D.3; 5.4.12.D.1)

- Trace the development of the theory of plate tectonics from the hypotheses of continental drift and seafloor spreading, using mathematical and conceptual models
- Describe features on Earth (e.g. volcanoes and earthquakes) resulting from the movement of Earth's crust, and the impact of those events on human life and property

January: D.) Atmosphere (5.1.12.A.1-D.3; 5.4.12.C.1-2; 5.4.12.E.1-2; 5.4.12.F.1 -3)

- Analyze the vertical structure of Earth's atmosphere and account for the global, regional, and local variations of these characteristics and their impacts on life

- Explain the interrelationships and interdependence among the Earth's
- systems Model the physical science principles that account for the global energy
- budget. Analyze the greenhouse effect in terms of natural and anthropogenic inputs

February/March: E) Climate (5.1.12.A.1-D.3; 5.4.12.C.1-2; 5.4.12.E.1-2; 5.4.12.F.1 -3)

- Explain the interrelationships and interdependence among the Earth's systems
- Explain how climates are affected by seasonal weather patterns, the Earth's relationship to the Sun, and by complex interactions between land, ocean, ice, and atmosphere.
- Predict the impact of anthropogenic climate change
- Calculate an individual's carbon footprint

April-June: F.) Energy, Land and Water Resources (5.1.12.A.1-D.3; 5.4.12.G.1 -7)

- Model biogeochemical models such as the hydrologic, carbon and nitrogen
- cycles Predict the impact of human activity on the cycling of matter and energy
- Assess the impact of human activity on Earth's land, oceans, atmosphere, and
- biota Evaluate, using scientific, economic, and other data, the potential environmental impact of large-scale adoption of emerging technologies to harness new sources of energy

Course Expectations & Skills

1. Create and maintain a class notebook
2. Write expository pieces such as opinion papers
3. Describe the contributions of scientists who made major discoveries and technological advances to solve today's problems.
4. Produce creative projects such as models of the solar system and posters to generate public awareness about issues facing society
5. Work collaboratively on activities such as inquiry-based experiments and group presentations

Textbook

Earth Science published by Glencoe/McGraw Hill Copyright: 2005

Grading Policy

Tests/Quizzes	20%	Labs/Projects	30%
Classwork	20%	Homework	5%
	Attitude/Participation	25%	

Core Standards for Science Reference

SCI.9-12.5.1.12 - [*Standard*] - All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science

SCI.9-12.5.1.12.A - [*Strand*] - Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.

SCI.9-12.5.1.12.A.a - [*Content Statement*] - Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.

SCI.9-12.5.1.12.A.1 - [*Cumulative Progress Indicator*] - Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

SCI.9-12.5.1.12.A.b - [*Content Statement*] - Interpretation and manipulation of evidence-based models are used to build and critique arguments/explanations.

SCI.9-12.5.1.12.A.2 - [*Cumulative Progress Indicator*] - Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

SCI.9-12.5.1.12.A.c - [*Content Statement*] - Revisions of predictions and explanations are based on systematic observations, accurate measurements, and structured data/evidence.

SCI.9-12.5.1.12.A.3 - [*Cumulative Progress Indicator*] - Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

SCI.9-12.5.1.12.B - [*Strand*] - Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.

SCI.9-12.5.1.12.B.a - [*Content Statement*] - Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.

SCI.9-12.5.1.12.B.1 - [*Cumulative Progress Indicator*] - Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.

SCI.9-12.5.1.12.B.b - [*Content Statement*] - Mathematical tools and technology are used to gather, analyze, and communicate results.

SCI.9-12.5.1.12.B.2 - [*Cumulative Progress Indicator*] - Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.

SCI.9-12.5.1.12.B.c - [*Content Statement*] - Empirical evidence is used to construct and defend arguments.

SCI.9-12.5.1.12.B.3 - [*Cumulative Progress Indicator*] - Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

SCI.9-12.5.1.12.B.d - [*Content Statement*] - Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.

SCI.9-12.5.1.12.B.4 - [*Cumulative Progress Indicator*] - Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

SCI.9-12.5.1.12.C -[*Strand*] Scientific knowledge builds on itself over time.

SCI.9-12.5.1.12.C.a - [*Content Statement*] - Refinement of understandings, explanations, and models occurs as new evidence is incorporated.

SCI.9-12.5.1.12.C.1 - [*Cumulative Progress Indicator*] - Reflect on and revise understandings as new evidence emerges.

SCI.9-12.5.1.12.C.b - [*Content Statement*] - Data and refined models are used to revise predictions and explanations.

SCI.9-12.5.1.12.C.2 - [*Cumulative Progress Indicator*] - Use data representations and new models to revise predictions and explanations.

SCI.9-12.5.1.12.C.c - [*Content Statement*] - Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.

SCI.9-12.5.1.12.C.3 - [*Cumulative Progress Indicator*] - Consider alternative theories to interpret and evaluate evidence-based arguments.

SCI.9-12.5.1.12.D - [*Strand*] - The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.

SCI.9-12.5.1.12.D.a - [*Content Statement*] - Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.

SCI.9-12.5.1.12.D.1 - [*Cumulative Progress Indicator*] - Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.

SCI.9-12.5.1.12.D.b - [*Content Statement*] - Science involves using language, both oral and written, as a tool for making thinking public.

SCI.9-12.5.1.12.D.2 - [*Cumulative Progress Indicator*] - Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

SCI.9-12.5.1.12.D.c - [*Content Statement*] - Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.

SCI.9-12.5.1.12.D.3 - [*Cumulative Progress Indicator*] - Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals

SCI.9-12.5.3.12 - [*Standard*] - All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.

SCI.9-12.5.3.12.A - [*Strand*] - Living organisms are composed of cellular units (structures) that carry out functions required for life. Cellular units are composed of molecules, which also carry out biological functions

SCI.9-12.5.3.12.A.a - [*Content Statement*] - Cells are made of complex molecules that consist mostly of a few elements. Each class of molecules has its own building blocks and specific functions.

SCI.9-12.5.3.12.A.1 - [*Cumulative Progress Indicator*] - Represent and explain the relationship between the structure and function of each class of complex molecules using a variety of models.

SCI.9-12.5.3.12.A.b - [*Content Statement*] - Cellular processes are carried out by many different types of molecules, mostly by the group of proteins known as enzymes.

SCI.9-12.5.3.12.A.2 - [*Cumulative Progress Indicator*] - Demonstrate the properties and functions of enzymes by designing and carrying out an experiment.

SCI.9-12.5.3.12.A.c - [*Content Statement*] - Cellular function is maintained through the regulation of cellular processes in response to internal and external environmental conditions.

SCI.9-12.5.3.12.A.3 - [*Cumulative Progress Indicator*] - Predict a cell's response in a given set of environmental conditions.

SCI.9-12.5.3.12.A.d - [*Content Statement*] - Cells divide through the process of mitosis, resulting in daughter cells that have the same genetic composition as the original cell.

SCI.9-12.5.3.12.A.4 - [*Cumulative Progress Indicator*] - Distinguish between the processes of cellular growth (cell division) and development (differentiation).

SCI.9-12.5.3.12.A.e - [*Content Statement*] - Cell differentiation is regulated through the expression of different genes during the development of complex multicellular organisms.

SCI.9-12.5.3.12.A.5 - [*Cumulative Progress Indicator*] - Describe modern applications of the regulation of cell differentiation and analyze the benefits and risks (e.g., stem cells, sex determination).

SCI.9-12.5.3.12.A.f - [*Content Statement*] - There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism.

SCI.9-12.5.3.12.A.6 - [*Cumulative Progress Indicator*] - Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).

SCI.9-12.5.3.12.B - [*Strand*] - Food is required for energy and building cellular materials. Organisms in an ecosystem have different ways of obtaining food, and some organisms obtain their food directly from other organisms.

SCI.9-12.5.3.12.B.a - [*Content Statement*] - As matter cycles and energy flows through different levels of organization within living systems (cells, organs, organisms, communities), and between living systems and the physical environment, chemical elements are recombined into different products.

SCI.9-12.5.3.12.B.1 - [*Cumulative Progress Indicator*] - Cite evidence that the transfer and transformation of matter and energy links organisms to one another and to their physical setting.

SCI.9-12.5.3.12.B.b - [*Content Statement*] - Each recombination of matter and energy results in storage and dissipation of energy into the environment as heat.

SCI.9-12.5.3.12.B.2 - [*Cumulative Progress Indicator*] - Use mathematical formulas to justify the concept of an efficient diet.

SCI.9-12.5.3.12.B - [*Strand*] - Food is required for energy and building cellular materials. Organisms in an ecosystem have different ways of obtaining food, and some organisms obtain their food directly from other organisms.

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SCI.9-12.5.3.12.B.2 - [*Cumulative Progress Indicator*] - Use mathematical formulas to justify the concept of an efficient diet.

SCI.9-12.5.3.12.B.c - [*Content Statement*] - Continual input of energy from sunlight keeps matter and energy flowing through ecosystems.

SCI.9-12.5.3.12.B.3 - [*Cumulative Progress Indicator*] - Predict what would happen to an ecosystem if an energy source was removed.

SCI.9-12.5.3.12.B.d - [*Content Statement*] - Plants have the capability to take energy from light to form sugar molecules containing carbon, hydrogen, and oxygen.

SCI.9-12.5.3.12.B.4 - [*Cumulative Progress Indicator*] - Explain how environmental factors (such as temperature, light intensity, and the amount of water available) can affect photosynthesis as an energy storing process.

SCI.9-12.5.3.12.B.e - [*Content Statement*] - In both plant and animal cells, sugar is a source of energy and can be used to make other carbon-containing (organic) molecules.

SCI.9-12.5.3.12.B.5 - [*Cumulative Progress Indicator*] - Investigate and describe the complementary relationship (cycling of matter and flow of energy) between photosynthesis and cellular respiration.

SCI.9-12.5.3.12.B.f - [*Content Statement*] - All organisms must break the high-energy chemical bonds in food molecules during cellular respiration to obtain the energy needed for life processes.

SCI.9-12.5.3.12.B.6 - [*Cumulative Progress Indicator*] - Explain how the process of cellular respiration is similar to the burning of fossil fuels.

SCI.9-12.5.3.12.C - [*Strand*] - All animals and most plants depend on both other organisms and their environment to meet their basic needs.

SCI.9-12.5.3.12.C.a - [*Content Statement*] - Biological communities in ecosystems are based on stable interrelationships and interdependence of organisms.

SCI.9-12.5.3.12.C.1 - [*Cumulative Progress Indicator*] - Analyze the interrelationships and interdependencies among different organisms, and explain how these relationships contribute to the stability of the ecosystem.

SCI.9-12.5.3.12.C.b - [*Content Statement*] - Stability in an ecosystem can be disrupted by natural or human interactions.

SCI.9-12.5.3.12.C.2 - [*Cumulative Progress Indicator*] - Model how natural and human-made changes in the environment will affect individual organisms and the dynamics of populations.

SCI.9-12.5.3.12.C - [*Strand*] - All animals and most plants depend on both other organisms and their environment to meet their basic needs.

SCI.9-12.5.3.12.C.a - [*Content Statement*] - Biological communities in ecosystems are based on stable interrelationships and interdependence of organisms.

SCI.9-12.5.3.12.C.1 - [*Cumulative Progress Indicator*] - Analyze the interrelationships and interdependencies among different organisms, and explain how these relationships contribute to the stability of the ecosystem.

SCI.9-12.5.3.12.C.b - [*Content Statement*] - Stability in an ecosystem can be disrupted by natural or human interactions.

SCI.9-12.5.3.12.C.2 - [*Cumulative Progress Indicator*] - Model how natural and human-made changes in the environment will affect individual organisms and the dynamics of populations.

SCI.9-12.5.3.12.D - [*Strand*] - Organisms reproduce, develop, and have predictable life cycles. Organisms contain genetic information that influences their traits, and they pass this on to their offspring during reproduction

SCI.9-12.5.3.12.D.a - [*Content Statement*] - Genes are segments of DNA molecules located in the chromosome of each cell. DNA molecules contain information that determines a sequence of amino acids, which result in specific proteins.

SCI.9-12.5.3.12.D.1 - [*Cumulative Progress Indicator*] - Explain the value and potential applications of genome projects.

SCI.9-12.5.3.12.D.b - [*Content Statement*] - Inserting, deleting, or substituting DNA segments can alter the genetic code. An altered gene may be passed on to every cell that develops from it. The resulting features may help, harm, or have little or no effect on the offspring's success in its environment.

SCI.9-12.5.3.12.D.2 - [*Cumulative Progress Indicator*] - Predict the potential impact on an organism (no impact, significant impact) given a change in a specific DNA code, and provide specific real world examples of conditions caused by mutations.

SCI.9-12.5.3.12.D.c - [*Content Statement*] - Sorting and recombination of genes in sexual reproduction result in a great variety of possible gene combinations in the offspring of any two parents.

SCI.9-12.5.3.12.D.3 - [*Cumulative Progress Indicator*] - Demonstrate through modeling how the sorting and recombination of genes during sexual reproduction has an effect on variation in offspring (meiosis, fertilization).

SCI.9-12.5.3.12.E - [*Strand*] - Sometimes, differences between organisms of the same kind provide advantages for surviving and reproducing in different environments. These selective differences may lead to dramatic changes in characteristics of organisms in a population over extremely long periods of time.

SCI.9-12.5.3.12.E.a - [*Content Statement*] - New traits may result from new combinations of existing genes or from mutations of genes in reproductive cells within a population.

SCI.9-12.5.3.12.E.1 - [*Cumulative Progress Indicator*] - Account for the appearance of a novel trait that arose in a given population.

SCI.9-12.5.3.12.E.b - [*Content Statement*] - Molecular evidence (e.g., DNA, protein structures, etc.) substantiates the anatomical evidence for evolution and provides additional detail about the sequence in which various lines of descent branched.

SCI.9-12.5.3.12.E.2 - [*Cumulative Progress Indicator*] - Estimate how closely related species are, based on scientific evidence (e.g., anatomical similarities, similarities of DNA base and/or amino acid sequence).

SCI.9-12.5.3.12.E.c - [*Content Statement*] - The principles of evolution (including natural selection and common descent) provide a scientific explanation for the history of life on Earth as evidenced in the fossil record and in the similarities that exist within the diversity of existing organisms.

SCI.9-12.5.3.12.E.3 - [*Cumulative Progress Indicator*] - Provide a scientific explanation for the history of life on Earth using scientific evidence (e.g., fossil record, DNA, protein structures, etc.).

SCI.9-12.5.3.12.E.d - [*Content Statement*] - Evolution occurs as a result of a combination of the following factors: Ability of a species to reproduce; Genetic variability of offspring due to mutation and recombination of genes; Finite supply of the resources required for life; Natural selection, due to environmental pressure, of those organisms better able to survive and leave offspring.

SCI.9-12.5.3.12.E.4 - [*Cumulative Progress Indicator*] - Account for the evolution of a species by citing specific evidence of biological mechanisms.

SCI.9-12.5.4.12 - [*Standard*] - All students will understand that Earth operates as a set of complex, dynamic, and interconnected systems, and is a part of the all-encompassing system of the universe.

SCI.9-12.5.4.12.A - [*Strand*] - Our universe has been expanding and evolving for 13.7 billion years under the influence of gravitational and nuclear forces. As gravity governs its expansion, organizational patterns, and the movement of celestial bodies, nuclear forces within stars govern its evolution through the processes of stellar birth and death. These same processes governed the formation of our solar system 4.6 billion years ago.

SCI.9-12.5.4.12.A.a - [*Content Statement*] - Prior to the work of 17th-century astronomers, scientists believed the Earth was the center of the universe (geocentric model).

SCI.9-12.5.4.12.A.1 - [*Cumulative Progress Indicator*] - Explain how new evidence obtained using telescopes (e.g., the phases of Venus or the moons of Jupiter) allowed 17th-century astronomers to displace the geocentric model of the universe.

SCI.9-12.5.4.12.A.b - [*Content Statement*] - The properties and characteristics of solar system objects, combined with radioactive dating of meteorites and lunar samples, provide evidence that Earth and the rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago.

SCI.9-12.5.4.12.A.2 - [*Cumulative Progress Indicator*] - Collect, analyze, and critique evidence that supports the theory that Earth and the rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago.

SCI.9-12.5.4.12.A.c - [*Content Statement*] - Stars experience significant changes during their life cycles, which can be illustrated with an Hertzsprung-Russell (H-R) Diagram.

SCI.9-12.5.4.12.A.3 - [*Cumulative Progress Indicator*] - Analyze an H-R diagram and explain the life cycle of stars of different masses using simple stellar models.

SCI.9-12.5.4.12.A.d - [*Content Statement*] - The Sun is one of an estimated two hundred billion stars in our Milky Way galaxy, which together with over one hundred billion other galaxies, make up the universe.

SCI.9-12.5.4.12.A.4 - [*Cumulative Progress Indicator*] - Analyze simulated and/or real data to estimate the number of stars in our galaxy and the number of galaxies in our universe.

SCI.9-12.5.4.12.A.e - [*Content Statement*] - The Big Bang theory places the origin of the universe at approximately 13.7 billion years ago. Shortly after the Big Bang, matter (primarily hydrogen and helium) began to coalesce to form galaxies and stars.

SCI.9-12.5.4.12.A.5 - [*Cumulative Progress Indicator*] - Critique evidence for the theory that the universe evolved as it expanded from a single point 13.7 billion years ago.

SCI.9-12.5.4.12.A.f - [*Content Statement*] - According to the Big Bang theory, the universe has been expanding since its beginning, explaining the apparent movement of galaxies away from one another.

SCI.9-12.5.4.12.A.6 - [*Cumulative Progress Indicator*] - Argue, citing evidence (e.g., Hubble Diagram), the theory of an expanding universe.

SCI.9-12.5.4.12.B - [*Strand*] - From the time that Earth formed from a nebula 4.6 billion years ago, it has been evolving as a result of geologic, biological, physical, and chemical processes.

SCI.9-12.5.4.12.B.a - [*Content Statement*] - The evolution of life caused dramatic changes in the composition of Earth's atmosphere, which did not originally contain oxygen gas.

SCI.9-12.5.4.12.B.1 - [*Cumulative Progress Indicator*] - Trace the evolution of our atmosphere and relate the changes in rock types and life forms to the evolving atmosphere.

SCI.9-12.5.4.12.B.b - [*Content Statement*] - Relative dating uses index fossils and stratigraphic sequences to determine the sequence of geologic events.

SCI.9-12.5.4.12.B.2 - [*Cumulative Progress Indicator*] - Correlate stratigraphic columns from various locations by using index fossils and other dating techniques.

SCI.9-12.5.4.12.B.c - [*Content Statement*] - Absolute dating, using radioactive isotopes in rocks, makes it possible to determine how many years ago a given rock sample formed.

SCI.9-12.5.4.12.B.3 - [*Cumulative Progress Indicator*] - Account for the evolution of species by citing specific absolute-dating evidence of fossil samples.

SCI.9-12.5.4.12.C - [*Strand*] - Earth's composition is unique, is related to the origin of our solar system, and provides us with the raw resources needed to sustain life.

SCI.9-12.5.4.12.C.a - [*Content Statement*] - Soils are at the interface of the Earth systems, linking together the biosphere, geosphere, atmosphere, and hydrosphere.

SCI.9-12.5.4.12.C.1 - [*Cumulative Progress Indicator*] - Model the interrelationships among the spheres in the Earth systems by creating a flow chart.

SCI.9-12.5.4.12.C.b - [*Content Statement*] - The chemical and physical properties of the vertical structure of the atmosphere support life on Earth.

SCI.9-12.5.4.12.C.2 - [*Cumulative Progress Indicator*] - Analyze the vertical structure of Earth's atmosphere, and account for the global, regional, and local variations of these characteristics and their impact on life.

SCI.9-12.5.4.12.D - [*Strand*] - The theory of plate tectonics provides a framework for understanding the dynamic processes within and on Earth.

SCI.9-12.5.4.12.D.a - [*Content Statement*] - Convection currents in the upper mantle drive plate motion. Plates are pushed apart at spreading zones and pulled down into the crust at subduction zones.

SCI.9-12.5.4.12.D.1 - [*Cumulative Progress Indicator*] - Explain the mechanisms for plate motions using earthquake data, mathematics, and conceptual models.

SCI.9-12.5.4.12.D.b - [*Content Statement*] - Evidence from lava flows and ocean-floor rocks shows that Earth's magnetic field reverses (North - South) over geologic time.

SCI.9-12.5.4.12.D.2 - [*Cumulative Progress Indicator*] - Calculate the average rate of seafloor spreading using archived geomagnetic-reversals data.

SCI.9-12.5.4.12.E - [*Strand*] - Internal and external sources of energy drive Earth systems.

SCI.9-12.5.4.12.E.a - [*Content Statement*] - The Sun is the major external source of energy for Earth's global energy budget.

SCI.9-12.5.4.12.E.1 - [*Cumulative Progress Indicator*] - Model and explain the physical science principles that account for the global energy budget.

SCI.9-12.5.4.12.E.b - [*Content Statement*] - Earth systems have internal and external sources of energy, both of which create heat.

SCI.9-12.5.4.12.E.2 - [*Cumulative Progress Indicator*] - Predict what the impact on biogeochemical systems would be if there were an increase or decrease in internal and external energy.

SCI.9-12.5.4.12.F - [*Strand*] - Earth's weather and climate systems are the result of complex interactions between land, ocean, ice, and atmosphere.

SCI.9-12.5.4.12.F.a - [*Content Statement*] - Global climate differences result from the uneven heating of Earth's surface by the Sun. Seasonal climate variations are due to the tilt of Earth's axis with respect to the plane of Earth's nearly circular orbit around the Sun.

SCI.9-12.5.4.12.F.1 - [*Cumulative Progress Indicator*] - Explain that it is warmer in summer and colder in winter for people in New Jersey because the intensity of sunlight is greater and the days are longer in summer than in winter. Connect these seasonal changes in sunlight to the tilt of Earth's axis with respect to the plane of its orbit around the Sun.

SCI.9-12.5.4.12.F.b - [*Content Statement*] - Climate is determined by energy transfer from the Sun at and near Earth's surface. This energy transfer is influenced by dynamic processes, such as cloud cover and Earth's rotation, as well as static conditions, such as proximity to mountain ranges and the ocean. Human activities, such as the burning of fossil fuels, also affect the global climate.

SCI.9-12.5.4.12.F.2 - [*Cumulative Progress Indicator*] - Explain how the climate in regions throughout the world is affected by seasonal weather patterns, as well as other factors, such as the addition of greenhouse gases to the atmosphere and proximity to mountain ranges and to the ocean.

SCI.9-12.5.4.12.F.c - [*Content Statement*] - Earth's radiation budget varies globally, but is balanced. Earth's hydrologic cycle is complex and varies globally, regionally, and locally.

SCI.9-12.5.4.12.F.3 - [*Cumulative Progress Indicator*] - Explain variations in the global energy budget and hydrologic cycle at the local, regional, and global scales.

SCI.9-12.5.4.12.G - [*Strand*] - The biogeochemical cycles in the Earth systems include the flow of microscopic and macroscopic resources from one reservoir in the hydrosphere, geosphere, atmosphere, or biosphere to another, are driven by Earth's internal and external sources of energy, and are impacted by human activity.

SCI.9-12.5.4.12.G.a - [*Content Statement*] - Natural and human-made chemicals circulate with water in the hydrologic cycle.

SCI.9-12.5.4.12.G.1 - [*Cumulative Progress Indicator*] - Analyze and explain the sources and impact of a specific industry on a large body of water (e.g., Delaware or Chesapeake Bay).

SCI.9-12.5.4.12.G.b - [*Content Statement*] - Natural ecosystems provide an array of basic functions that affect humans. These

functions include maintenance of the quality of the atmosphere, generation of soils, control of the hydrologic cycle, disposal of wastes, and recycling of nutrients.

SCI.9-12.5.4.12.G.2 - [*Cumulative Progress Indicator*] - Explain the unintended consequences of harvesting natural resources from an ecosystem.

SCI.9-12.5.4.12.G.c - [*Content Statement*] - Movement of matter through Earth's system is driven by Earth's internal and external sources of energy and results in changes in the physical and chemical properties of the matter.

SCI.9-12.5.4.12.G.3 - [*Cumulative Progress Indicator*] - Demonstrate, using models, how internal and external sources of energy drive the hydrologic, carbon, nitrogen, phosphorus, sulfur, and oxygen cycles.

SCI.9-12.5.4.12.G.d - [*Content Statement*] - Natural and human activities impact the cycling of matter and the flow of energy through ecosystems.

SCI.9-12.5.4.12.G.4 - [*Cumulative Progress Indicator*] - Compare over time the impact of human activity on the cycling of matter and energy through ecosystems.

SCI.9-12.5.4.12.G.e - [*Content Statement*] - Human activities have changed Earth's land, oceans, and atmosphere, as well as its populations of plant and animal species.

SCI.9-12.5.4.12.G.5 - [*Cumulative Progress Indicator*] - Assess (using maps, local planning documents, and historical records) how the natural environment has changed since humans have inhabited the region.

SCI.9-12.5.4.12.G.f - [*Content Statement*] - Scientific, economic, and other data can assist in assessing environmental risks and benefits associated with societal activity.

SCI.9-12.5.4.12.G.6 - [*Cumulative Progress Indicator*] - Assess (using scientific, economic, and other data) the potential environmental impact of large-scale adoption of emerging technologies (e.g., wind farming, harnessing geothermal energy).

SCI.9-12.5.4.12.G.g - [*Content Statement*] - Earth is a system in which chemical elements exist in fixed amounts and move through the solid Earth, oceans, atmosphere, and living things as part of geochemical cycles.

SCI.9-12.5.4.12.G.7 - [*Cumulative Progress Indicator*] - Relate information to detailed models of the hydrologic, carbon, nitrogen, phosphorus, sulfur, and oxygen cycles, identifying major sources, sinks, fluxes, and residence times.

Cross Curricular Core Standards applied to Science

Area	Standard heading	key concepts
Visual/Performing Arts		
no obvious general connections		
Area	**Standard heading**	**key concepts**
Health & Phys Ed.		
2.1.12.A.2	Personal Growth	debate ethics of medical technology use
2.1.12.B.3	Nutrition	analyze contribution of 4 nutrient classes to health
2.1.12.C.1	Disease	diseases/prevention/strategies
2.1.12.D.1	Safety	intentional and unintentional injuries to adolescents
2.2.12.B.1	Decisions/Goals	poor vs. good decision making
2.3.12.A.1	Medicines	benefits/risks of medicines/supplements
2.3.12.A.2	Medicines	evaluating effectiveness of medicines
2.3.12.B.2	Drugs	debate legal consequences of drug use/sale/possession
2.5.12.A.2	Movement	analyze forces involved in sports movements
2.6.12.A.5	Fitness	debate performance enhancing drug use
Area	**Standard heading**	**key concepts**
Social Studies		
6.1.12.B.1	US History	relate geographic variations to resource development
6.1.12.B.5	US History	urbanization and effect on quality of life
6.1.12.B.6	US History	struggle between preserving and using natural resources
6.1.12.D.6	US History	impact of technology
6.1.12.B.9	US History	agriculture/overproduction/dust bowl
6.1.12.C.11	US History	relate military inventions to new technology
6.1.12.C.12	US History	scientific advancements
6.1.12.C.13	US History	environmental impact laws
6.1.12.B.16	US History	natural resources/sustainability
6.1.12.C.16	US History	impact of technology
6.2.12.C.3	World History	impact of technology
6.2.12.C.5	World History	role of petroleum on technology
Area	**Standard heading**	**key concepts**
Technology		
8.1.12.A.1	operations	spreadsheet/tables/graphs/interpretation
8.1.12.A.2	operations	edit documents
8.1.12.A.4	operations	electronic portfolio
8.1.12.C.1	collaboration	develop solution to problem with peers online
8.1.12.D.2	digital citizenship	appropriate copyrights use
8.1.12.E.1	research	systematic digital problem-solving
8.1.12.F.1	critical thinking	select and use databases
8.2.12.F.2	resources	materials science
Area	**Standard heading**	**key concepts**
World Languages		
7.1.IL.A.7	word meaning	infer meanings of new words from context/prefix/suffix
Area	**Standard heading**	**key concepts**
21st Century Life		
9.1.12.A.1	critical thinking	apply critical thinking in structured setting

9.1.12.B.1	creativity/innovation	data presentation	
9.1.12.B.2	creativity/innovation	create and respond to feedback	
9.1.12.C.4	collaboration/leadership	demonstrate collaborative skills	
9.1.12.E.1	communication	create appropriate digital messages	
9.1.12.F.2	ethics	demonstrate work ethic	
9.1.12.F.6	ethics	scientific ethical dilemmas	
9.2.12.A.5	careers	evaluate technology advances	
9.2.12.E.3	critical consumer	evaluate media bias effect on consumer	
9.3.12.C.2	career prep	education/skills needed	
9.3.12.C.13	career prep	workplace safety	
9.4.H	health science	cluster of skills	LAL, Math, Sci, Physiology
		92 cpi's	depending on career path
9.4.O	STEM	cluster of skills	science, technology
		86 cpi's	engineering, math

Area	**Standard heading**	**key concepts**
LAL CCS		
anchor standards	reading	
	informational text	grade 9-10
		grade 11-12
RI.9-10.1 or RI.11-12.1	key ideas/details	read and draw inferences from text
RI.9-10.2 or RI.11-12.2	key ideas/details	summarize key details/ideas
RI.9-10.3 or RI.11-12.3	key ideas/details	analyze how and why of text
RI.9-10.7 or RI.11-12.7	integration of ideas	evaluate content
RI.9-10.8 or RI.11-12.8	integration of ideas	evaluate reasoning
RI.9-10.9 or RI.11-12.9	integration of ideas	analyze/compare texts
RI.9-10.10 or RI.11-12.10	range of reading	complex text
	writing	
W.9-10.1 or W.11-12.1	type	write arguments
W.9-10.2 or W.11-12.2	type	write explanatory
W.9-10.3 or W.11-12.3	type	write narratives
W.9-10.6 or W.11-12.6	production	use technology to produce
W.9-10.7 or W.11-12.7	research	research on focused questions
W.9-10.8 or W.11-12.8	research/production	gather relevant info
W.9-10.9 or W.11-12.9	informational text	draw info from textual sources
W.9-10.10 or W.11-12.10	range of writing	for extended periods
	speaking/listening	
SL.9-10.1 or SL.11-12.1	comprehension	collaboration
SL.9-10.2 or SL.11-12.2	comprehension	evaluation of media
SL.9-10.3 or SL.11-12.3	comprehension	evaluation of speaker
SL.9-10.4 or SL.11-12.4	presentation	oral presentation
SL.9-10.5 or SL.11-12.5	presentation	digital media use
SL.9-10.6 or SL.11-12.6	presentation	adapt speech to situation
	command of English	
L.9-10.1 or L11-12.1	conventions	grammar, usage
L.9-10.2 or L11-12.2	conventions	punctuation
L.9-10.3 or L11-12.3	knowledge	application of writing,/speaking skills

L.9-10.4 or L11-12.4	vocabulary	use context clues
L.9-10.5 or L11-12.5	vocabulary	demonstrate understanding
L.9-10.6 or L11-12.6	vocabulary	use subject specific vocabulary
	science/technical subjects	
	reading	
RST.9-10.1 or RST.11-12.1	key ideas/details	cite specific evidence
RST.9-10.2 or RST.11-12.2	key ideas/details	determine central ideas/conclusions
RST.9-10.3 or RST.11-12.3	key ideas/details	follow procedures/tasks
RST.9-10.4 or RST.11-12.4	craft/structure	determine specific meanings
RST.9-10.5 or RST.11-12.5	craft/structure	analyze relationships
RST.9-10.6 or RST.11-12.6	craft/structure	analyze author's intent
RST.9-10.7 or RST.11-12.7	integration of ideas	translate/equations-word problems
RST.9-10.8 or RST.11-12.8	integration of ideas	assess support for argument
RST.9-10.9 or RST.11-12.9	integration of ideas	compare/contrast findings
RST.9-10.10 or RST.11-12.10	range/level	level appropriate independent reading
	writing	
WHST.9-10.1 or WHST.11-12.1	type/purpose	argument(s)
WHST.9-10.2 or WHST.11-12.2	type/purpose	explanatory text
WHST.9-10.4 or WHST.11-12.4	produce/distribute	clear coherent writing
WHST.9-10.5 or WHST.11-12.5	produce/distribute	revise and edit
WHST.9-10.6 or WHST.11-12.6	produce/distribute	use technology
WHST.9-10.7 or WHST.11-12.7	research	research to answer question/problem
WHST.9-10.8 or WHST.11-12.8	research	gather appropriate sources
WHST.9-10.9 or WHST.11-12.9	research	use evidence to support/refute
WHST.9-10.10 or WHST.11-12.10	range/level	write for extended periods
Area	**Standard heading**	**key concepts**
Math CCS		
	real number system	
N-R.1	exponents/radicals	explain use of exponents/radicals
N-R.2	exponents/radicals	rewrite expressions
N-R.3	exponents/radicals	explain sum and product of rational/irrational #'s
	quantities	
N-Q.1	units for problems	guide problem solution/graph scale
N-Q.2	units for problems	define quantities appropriately
N-Q.3	units for problems	choose level of accuracy/sig figs
	complex numbers	
N-CN.1	arithmetic with	complex number form
N-CN.2	arithmetic with	use commutative, associative, distributive properties
N-CN.3	arithmetic with	find conjugates
N-CN.4	rectangular/polar	represent complex numbers on plane
N-CN.5	rectangular/polar	represent addition, subtraction, multiplication, conjugation on plane
N-CN.6	rectangular/polar	calculate distance between points on plane
N-CN.7	polynomials	solve quadratic equations

N-CN.8	polynomials	extend polynomials
N-CN.9	polynomials	fundamental theorem of algebra
	vector/matrix	
N-VM.1	model with vectors	recognize vectors having quantity/direction
N-VM.2	model with vectors	find components of vectors
N-VM.3	model with vectors	solve vector problems
N-VM.4	operations with vectors	add and subtract vectors
N-VM.5	operations with vectors	multiply vector by scalar
N-VM.6	operations on matrices	use matrices for data
N-VM.7	operations on matrices	multiply matrices by scalars
N-VM.8	operations on matrices	add, subtract, multiply matrices
N-VM.9	operations on matrices	recognize not commutative
N-VM.10	operations on matrices	0 and 1 similar to real numbers' role
N-VM.11	operations on matrices	multiply a vector by a matrix
N-VM.12	operations on matrices	work with 2x2 matrices
	structure in expressions	
A-SSE.1	interpret structure	quantity in context
A-SSE.2	interpret structure	rewrite expressions
A-SSE.3	equivalent forms	factoring, etc.
A-SSE.4	equivalent forms	derive formula and solve
	polynomials	
A-APR.1	arithmetic with	add, subtract, multiply polynomials
A-APR.2	factoring	remainder theorem
A-APR.3	factoring	zeroes of polynomials
A-APR.4	use to solve problems	identity
A-APR.5	use to solve problems	binomial theorem
A-APR.6	rewrite	rewrite expressions
A-APR.7	rewrite	add, subtract, multiply polynomials
	create equations	
A-CED.1	describing relationships	one variable
A-CED.2	describing relationships	two variables
A-CED.3	describing relationships	inequalities
A-CED.4	describing relationships	rearrange formulas to solve for variables
	reasoning equations/inequalities	
A-REI.1	process	explain/justify solutions
A-REI.2	process	solve problems
A-REI.3	solve in one variable	linear
A-REI.4	solve in one variable	quadratic
A-REI.5	solve systems	proofs
A-REI.6	solve systems	solve linear
A-REI.7	solve systems	solve linear/quadratic combos
A-REI.8	solve systems	represent as a matrix
A-REI.9	solve systems	find inverse of matrix
A-REI.10	solve/represent graphically	understand coordinate plane
A-REI.11	solve/represent graphically	solve y = f(x)
A-REI.12	solve/represent graphically	graph linear inequality

	functions	
F-IF.1	concept	definition of function
F-IF.2	concept	use function notation
F-IF.3	concept	recognize as subset of integers
F-IF.4	interpret functions	interpet key features (intercepts)
F-IF.5	interpret functions	relate domain to graph
F-IF.6	interpret functions	calculate rate of change
F-IF.7	analyze functions	graph functions
F-IF.8	analyze functions	write functions
F-BF.1	build functions	describing relationship between 2 quantities
F-BF.2	build functions	model situations
F-BF.3	build new from existing	find inverse functions
F-BF.4	build new from existing	identify effects of change on graphs
F-BF.5	build new from existing	inverse relationship between exponent and log
	geometry	
G.CO.1	congruence	defn of angle, circle, perpendicular
G.CO.4	congruence	defn rotation, reflection
G.CO.8	congruence	ASA, SAS, SSS
G.CO.11	congruence	make geom constructions
G.CO.12	congruence	make geom constructions
G.SRT.5	right triangles, trig., similarity	use similarity and congruence
G.SRT.6	right triangles, trig., similarity	side ratios
G.SRT.7	right triangles, trig., similarity	sine & cosine
G.SRT.8	right triangles, trig., similarity	pythagorean theorem
G.SRT.9	right triangles, trig., similarity	area of triangle
G.SRT.10	right triangles, trig., similarity	sine & cosine
G.SRT.11	right triangles, trig., similarity	sine & cosine
G-C.2	circles	angles, radii, chords
G-GPE.1	geometric equations	circles
G-GPE.2	geometric equations	parabolas/focus/directrix
G-GPE.3	geometric equations	ellipse/parabola
G-GPE.4	geometric equations	use coordinates algebraically
G-GPE.7	geometric equations	perimeters/areas
G-GMD.3	geometric measurement	solve problems
G-GMG.1	model with geometry	describe objects
G-GMG.2	model with geometry	density problems
G-GMG.3	model with geometry	application to design
	statistics & probability	
S-ID.1	interpret data	plots/graphs
S-ID.2	interpret data	choose statistics to analyze

S-ID.3	interpret data	outliers
S-ID.4	interpret data	normal distribution
S-ID.5	interpret data	summarize data - 2 variables
S-ID.6	interpret data	represent data - 2 variables
S-ID.7	interpret data	slope/rate
S-ID.8	interpret data	linear fit
S-ID.9	interpret data	distinguish correlation/causation
S-IC.1	inferences & conclusions	random sampling
S-IC.2	inferences & conclusions	analyze model consistency
S-IC.3	inferences & conclusions	recognize purpose
S-IC.4	inferences & conclusions	use samples for estimates
S-IC.5	inferences & conclusions	use data to compare treatments
S-IC.6	inferences & conclusions	evaluate data reports
S-CP.1	probability rules	describe events as subsets
S-CP.2	probability rules	independent events
S-CP.3	probability rules	conditional probability
S-CP.4	probability rules	2 way freq tables
S-CP.5	probability rules	communicate in plain English
S-CP.6	probability rules	conditional probability
S-CP.7	probability rules	addition rule
S-CP.8	probability rules	multiplication rule
S-CP.9	probability rules	permutations/combinations
S-MD.1	use prob to make decisions	random variables
S-MD.2	use prob to make decisions	calculate expected values
S-MD.3	use prob to make decisions	construct distribution form theoretical values
S-MD.4	use prob to make decisions	construct distribution form assigned values
S-MD.5	use prob to make decisions	weigh possible outcomes
S-MD.6	use prob to make decisions	use to make fair decisions
S-MD.7	use prob to make decisions	analyze decisions/strategies