Black Horse Pike Regional School District Curriculum Template

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

Unit 1: Introduction to Environmental Science

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Environmental Science/ Introduction to Environmental Science **Grade(s):** 11-12	**Unit Summary**: This unit introduces students to the discipline of environmental science. Grounded in empirical science, environmental has a wider scope than the traditional sciences because of its focus on solving emerging and pressing problems. Students will apply the sciences they have studied thus far: biological, chemical, and physical sciences. Students will study the impact of human activity in light of current problems such as energy supplies, global climate change, and resource consumption. This course promotes a policy of sustainability in local settings such as the home and school, and at the national and global level. This unit, frames science in a political and social light that promotes considerate and active citizenship. Students will learn how environmental policies are developed through democratic channels, with an eye on social justice and activism. Students will be empowered by learning about careers in environmental science as well as opportunities to take action to solve problems. The following unit on biodiversity will build on these themes through direct application and concrete examples.
Essential Question(s): What is the focus of environmental science? How should we view natural resources and their consumption? How do we identify, research, and solve environmental problems? How can we best balance our own interests and needs with the health of the environment?	**Enduring Understanding(s):** Environmental scientists study how the natural world works, and how humans and the environment affect each other. Both the human population and the consumption of natural resources continue to increase dramatically. Sustainability implies that natural resources are consumed in a way that preserves their supply, as well as environmental health and stable human societies. Scientists monitor environmental health through testing hypotheses, and developing theories Scientists develop ethical solutions to environmental problems that consider benefits and outcomes, as well as the cultures and worldviews of other people. Environmental policies employ science, ethics, economics, and the political process to

How are environmental policies developed? How do the nonliving parts of Earth's systems provide the basic materials to support life and human societies?	solve environmental problems. Earth can be viewed through four interdependent and interacting systems: the hydrosphere, atmosphere, geosphere, and lithosphere.

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	**1. NGSS:** HS-ESS-1,2,3 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 **2. NGSS**: HS-LS4-5, HS-ESS3-3 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 **3. NGSS**: HS-ESS3-4, HS-ETS-1-3 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 **4. NGSS**: HS-ESS3-4, HS-ETS-1-3 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5,
1. Explain the focus of environmental science 2. Describe recent trends in human population growth and resource consumption in light of sustainability 3. Evaluate solutions to environmental problems through the lens of environmental ethics. 4. Apply the model of the Tragedy of the Commons to define practices as sustainable or unsustainable. 5. List the steps involved in the process of developing environmental policy. 6. Define the four spheres of Earth's systems and cite examples from each. 7. Create a model that illustrates how a human activity can impact all four of Earth's spheres through system interactions.	

	SOC.9-12.6.1.12B.5, 6 **5. NGSS**: HS-ESS3-4, HS-ETS-1-3 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 **6. NGSS**: HS-LS2-5 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 **7. NGSS**: HS-LS2-5; HS-ESS3-3 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, Social Studies, 21st Century Skills, and Language Arts.
Students will apply appropriate mathematical and algebraic concepts to seek patterns in empirical data.
They will discuss environmental implications of societal practices and political decisions, and creating presentations using programs like Powerpoint, Prezi and Google Slides.

Students will engage with the following text:

Environmental Science, Pearson.
Students will use designated sections of chapters 1, 2, and 3 to define key terms and concepts, to stimulate discussion, and to inspire topics for further exploration.

Students will write:

Students will use Cornell note-taking strategies when collect textual information, write responses to warm-up questions, and answer conclusion questions in labs. Literacy strategies also include “Think, Pair & Share,” summaries/abstracts of current events articles, position papers, and reflective journal entries.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will be presented information in the form of guided reading and multimedia presentations such as PowerPoint presentations and videos.

Guest speakers may also be available for presentations and Q&A.

The teacher will lead whole class discussions and facilitate small group discussions by monitoring student input and asking questions to elicit student prior knowledge and expand conversation, and provide concrete examples to emphasize real world relevance.

Students will use, analyze, and modify models to explore the interaction of Earth's spheres.

Students will read and take notes through various strategies. Sources include the textbook and supplementary articles. These articles can be supplied by the teacher, or approved by the teacher once found by the student.

Students will collaborate in small groups to gather information, analyze and interpret relevant data and textual evidence provided by the teacher.

The teacher will guide whole class and small group discussions by monitoring student input and asking questions to elicit student prior knowledge and expand conversation, and provide concrete examples to emphasize real world relevance.

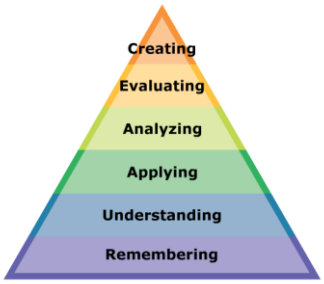
Students will extend their knowledge by researching scenarios, situations, and topics that are most relevant to them.

Examples of strategies and modified strategies are in the District Shared\Science...

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 questioning, periodic quizzes, text-based questions and lab conclusion questions. Environmental Situation Cards can also be used for formative assessment

These assessments can be conducted during instruction, at the end of the period, or at the beginning of a successive class period. (Remembering through applying)

Accommodations/Modifications:

Accommodations and/or modifications will be made in accordance with individual student needs. These may include but not be limited to: chunking text, providing extra time, and working with students' individual needs

Summative Assessments:

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

Examples of strategies and modified strategies are in the District Shared\Science...

Accommodations/Modifications:

Accommodations and/or modifications will be made in accordance with individual student needs. These may include but not be limited to: chunking text, providing extra time, and working with students individually.

Performance Assessments:

Performance assessments include presentations on specific environmental issues, papers in which students develop environmental policies, and case study analyses. (Remembering through Creating)

Students can explore the Tragedy of the Commons through the hands-on simulation Pretzel Power found at http://www.need.org/Files/curriculum/guides/pretzelPower.pdf

Examples of strategies and modified strategies are in the District Shared\Science...

Accommodations/Modifications:

Accommodations and/or modifications will be made in accordance with individual student needs. These may include but not be limited to: chunking text, providing extra time, and working with students individually.

Unit 2: Biodiversity

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title:
Environmental Science/Biodiversity</td><td rowspan="2">Unit Summary:
Biodiversity considers the variety of life on Earth. It is important to understand biodiversity at different levels of biological organization for practical and ethical reasons. We can measure and protect biodiversity at the genetic, species, and ecosystem level to manage the variety and distribution of living things in ways that benefits and sustains the environment itself as well as human activities. By maintaining biodiversity, we can discover and develop valuable products and services. The loss of biodiversity signals environmental problems both locally and globally. Often, human activity is directly or indirectly leads to the loss of biodiversity. Different legal efforts have supported solutions that protect biodiversity. These approaches have social and economic consequences that need to be evaluated by all citizens before being implemented. This unit is followed by a unit on urbanization, which connects biodiversity conservation to personal actions and direct solutions.</td></tr>
<tr><td>Grade Level(s):
11-12</td></tr>
<tr><td>Essential Question(s):

How do we measure biodiversity?

What are the benefits of biodiversity?

Are we experiencing a mass extinction? If so, what are the major consequences?

What are the causes of decreased biodiversity?

How can we protect biodiversity?</td><td>Enduring Understanding(s):

Species diversity, genetic diversity, and ecosystem diversity contribute to overall biodiversity. It varies among taxonomic groups and geographic regions.

Biologically diverse ecosystems provide economically valuable products and services.

Because we are experiencing higher than normal rates of background extinction, scientists conclude that humans have triggered the sixth mass extinction in Earth’s history. We will suffer a domino effect as species extirpation leads to extinction and food webs and then ecosystems collapse.

Habitat change and loss, species introduction, pollution, overharvesting, and climate change are the main causes of biodiversity loss.

Nations can pass laws and sign international treaties that protect biodiversity. We can manage entire ecosystems and habitats. We can also manage, protect, and reintroduce endangered and threatened species.</td></tr>
</table>

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	1.**NGSS:** HS-LS2-2 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 2. **NGSS:** HS-LS2-1,2 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 3. **NGSS:** HS-LS2-2, HS-ESS3-3 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 4. **NGSS:** HS-LS2-2 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 5. **NGSS:** HS-LS2-7 **Other Content**
1. Define biodiversity and evaluate it in terms of species diversity. **2.** Compare two ecosystems in terms of biodiversity. **3.** Describe the economic and societal benefits of biodiversity. **4.** Explain how scientists monitor biodiversity 5. Calculate extinction rates to evaluate claims that we are in the midst of a mass extinction. 6. List five major causes of biodiversity loss. 7. Cite two legal actions to protect biodiversity. 8. Debate single-species and ecosystem/habitat approaches to biodiversity conservation.	

	Areas: RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 6. **NGSS:** HS-LS2-7 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 7. **NGSS:** HS-ESS3-4 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 8. **NGSS:** HS-ESS3-4 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, Social Studies, 21st Century Skills, Language Arts, and FACS. Students will be calculating percentages and creating and analyzing graphs,

discussing environmental implications of societal practices and political decisions, and creating presentations using programs like PowerPoint, Prezi and Google Slides. They will also reflect on the sources of food, medicine, clothing, and other necessities.

Students will engage with the following text:

Environmental Science, Pearson.
Students will use designated sections of chapters 7 to define key terms and concepts, to stimulate discussion, and to inspire topics for further exploration.

Students will write:

Students will use Cornell-note taking strategies when collecting textual information, write responses to warm-up questions and answer conclusion questions in labs. Literacy strategies may also include "Think, Pair & Share," summaries/abstracts of current events articles, position papers, and reflective journal entries.

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 information in the form of guided reading and multimedia presentations such as PowerPoint presentations and videos.

The teacher will lead whole class discussions and facilitate small group discussions by monitoring student input and asking questions to elicit student prior knowledge and expand conversation, and provide concrete examples to emphasize real world relevance.

Students will use, analyze, and modify models to explore the interaction of Earth's spheres.

Students will read and take notes through various strategies. Sources include the textbook, and supplementary articles. These articles can be supplied by the teacher, or approved by the teacher once found by the student.

Students will collaborate in small groups to gather information, and analyze and interpret relevant data and textual evidence provided by the teacher.

The teacher will guide whole class and small group discussions by monitoring student input and asking questions to elicit student prior knowledge and expand conversation, and provide concrete examples to emphasize real world relevance.

Students will extend their knowledge by researching scenarios, situations, and topics that are most relevant to them.

PART IV: EVIDENCE OF LEARNING

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

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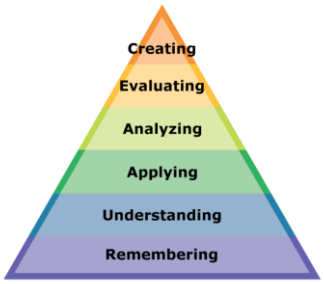


Formative Assessments:

Formative assessments will be in the form of oral questioning, periodic quizzes, text-based questions, and lab conclusion questions. Environmental Situation Cards can also be used for formative assessment.

These assessments can be conducted during instruction, at the end of the period, or at the beginning of a successive class period. (Remembering through Applying)

Accommodations/Modifications:

Accommodations and/or modifications will be made in accordance with individual student needs. These may include but not be limited to: chunking text, providing extra time, and working with students' individual needs

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)

Accommodations/Modifications:

Accommodations and/or modifications will be made in accordance with individual student needs. These may include but not limited to: chunking text, providing extra time, and working with students' individual needs

Performance Assessments:

Performance assessments include presentations on specific environmental issues, papers in which students develop environmental policies and positions, and case study analyses (Remembering through Creating)

Students can analyze a case study on threats to biodiversity (http://sciencecases.lib.buffalo.edu/cs/files/hawaii.pdf).

Accommodations/Modifications:

Accommodations and/or modifications will be made in accordance with individual student needs. These may include but not be limited to: chunking text, providing extra time, and working with students individually.

Unit 3: Urbanization

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title:
Environmental Science/
Urbanization

Grade Level(s): 11-12</td><td>Unit Summary:
This unit will discuss how different types of societies affect their environment. The unit will start of with a comparison of how developed and developing countries utilize their resources. Students will explore the relationships between land cover and land usage and relate this to environmental issues. The unit will then narrow in on the negative and positive effects of urbanization on land use and coverage. A connection will be made between this unit and the preceding unit on biodiversity as increased human development can have detrimental effects on biodiversity.
The focus will then shift to the effects of urban sprawl. As humans move away from the center of cities to less densely populated urban and suburban areas land consumption increases. The interaction between population growth and land consumption affects transportation, pollution, public health, land use and the economics of an area.
Sustainable cities are being designed to deal with the effects of urbanization sprawl. Planning a sustainable city involves the use of green technologies that reduce the amount of resources being consumed while maintaining human comfort. The unit will culminate in an exploration of what it takes to plan a sustainable city.
Concepts in this unit will show up again in the units on water, energy and mineral resources and processes that shape the earth.</td></tr>
<tr><td>Essential Question(s):

1.What factors influence the impact a population has on its environment?
2. How do we use the land we live on?
3. How can the effects of urbanization lead to sprawl?
4. What are the characteristics of a sustainable city?</td><td>Enduring Understanding(s):

1. The impacts of a society on its environment are dependent upon the type and size of the society. Where as developing societies tend to strain fragile environments to meet survival needs developed societies consume vast quantities of resources. Short sightedness and poor planning have created a need for new technologies that allow us to live a more sustainable lifestyle.
2. Creating urban areas and shifting population from the countryside to urban areas is called urbanization. Humans activities that occur on land are related to the vegetation and manufactured structures that cover land. Humans change both land use and land cover when they urbanize an area. The creation of cities can have both negative impacts and beneficial impacts on the environment.
3. When people move out of cities it affects transportation, pollution, and land use among other things. This movement out of the cities to create low density urban or suburban zones is called sprawl.
4. Many cities around the world have made progress toward sustainability. Creating and maintaining a sustainable city requires a significant amount of planning. Key elements considered when planning a sustainable city include parks, open spaces, transportation</td></tr>
</table>

	and technology that allows us conserves resources without sacrificing comfort.

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 how different types of human societies impact their environments. **2.** Differentiate between land cover and land use, and describe how people affect both. **3.** Describe the environmental impacts of urbanization. **4**. Explain the impacts sprawl has on an area. **5.** Explain the importance of mass transit options and open space to a city and its residents. **6.** Differentiate green buildings from conventional buildings. **7**. Discuss the progress toward sustainability some cities have made and its importance to the world.	**1. NGSS:** HS-ESS3-3.A,C, HS-LS2-1 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 **2. NGSS:** HS-ESS3-3.C, HS-LS2-1 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6,7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.B, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 **3. NGSS:** HS-ESS3-3.C, HS-LS2-1 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.B, SOC.9-12.6.2.12 E.6, 7, 8, 9,

	SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 **4.NGSS:** HS-ESS3-3. C, HS-LS2-1 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, SOC.9-12.6.2.12 E.6, 7, 8, **9**, SOC.9-12.6.1.12B.5, 6 **5. NGSS:** HS-ESS3-3. C **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, SOC.9-12.6.1.12B.5, 6 **6. NGSS:** HS-ESS3-4.C, HS-ETS1-1.B **Other Content Areas:** WHST.11-12.6, 7, 8, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.2, B.3, C.1,2, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.3.12 E.1.5, TEC.9-12.8.1.12 A.5, TEC.9-12.8.1.12 B.4, TEC.9-12.8.1.12 B.12, TEC.9-12.8.2.12 A.2, SOC.9-12.6.1.12B.5, 6 **7. NGSS:** HS-ESS3-4.C, HS-ETS1-1.B **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3,

	5, 6, 9, SOC.9-12.6.2.12 E.6, 7, 8, 9, SOC.9-12.6.1.12B.5, 6

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, Social Studies, 21st Century Skills, and Language Arts. Students will be calculating percentages and creating and analyzing graphs, discussing environmental implications of societal practices and political decisions, and creating presentations using programs like Powerpoint, Prezi and Google Slides.

Examples:
Ecological Footprints Activity on page 253
Real Data Activity on page 302 in textbook
Land Use Lab

- examples of strategies and modified strategies are in the District Shared\Science...

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: do not make students write in complete sentences, provide extra time, work with students individually.

Ecological Footprints Activity- Provide example calculations, work with students one on one.
Real Data Activity on page 302- Tier the level of questions about the graph and assign questions to students based on mastery of reading graphs (page 180 in the workbook has questions for lowest tier).
Land Use Lab- Provide a space for students to check off each step as they complete it, provide a suggested amount of time that each step should take to assist students with planning and staying on task, demonstrate procedure, provide sample calculations, work with students one on one, provide examples of pie charts and bar graphs.

Students will engage with the following text:

Environmental Science, Pearson. – Students will use designated sections of the text as a starting point for research into environmental effects of different types of societies.

Web resources- Students will use web resources to research green building design elements as a starting point for a green building design project.

Example:

8.3 Reading Worksheet- Students will read pages 242-247 in their textbook, use context clues to help them come up with a definition for each key term, and answer higher order questions to assist them in reflecting on the text and gaining a deeper understanding of the material.

Green Building Design project

Students will write:

In addition to warm ups, homework assignments and answers to lab follow up questions, students will write persuasive arguments and create presentations using PowerPoint, Prezi or Google Slides.

Example:
Green Building Design Project
Central Case Persuasive Argument- Students will read the central case on page 291. After reading they will write a persuasive argument supported by information learned in the unit answering the question, if you were a resident of Portland Oregan would you be for or against measure 49?

- examples of strategies and modified strategies are in the District Shared\Science...

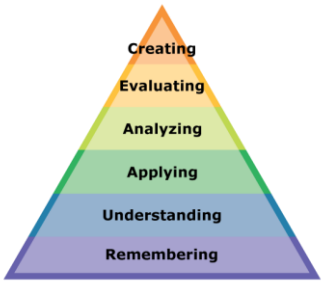
PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

- Students will engage the textbook, analyze graphs, and aerial photographs to explore land use and its environmental effects.
- Students engage in small group discussions to explore solutions for the negative effects of land use on the environment.
- Information will be presented to Students in the forms of multimedia presentations including videos and slide presentations.
- 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.
- Students will use the internet to research green building requirements and design elements and work in small groups to design and present an original green building design.

- examples of strategies and modified strategies are in the District Shared\Science...



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 warm ups, periodic quizzes, text based questions, participation in class discussions and writing assignments.

Examples:
10.1 Reading Questions- Evaluating
10.2 Quiz- Applying

- examples of assessments and modified assessments are in the District Shared…..

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: do not make students write in complete sentences, provide extra time, work with students individually.

10.1 Reading questions: Give students a set number of higher order questions to choose from instead of having them answer all higher order questions, do not make students answer follow up questions in complete sentences, allow students to work in pairs.

10.2 Quiz: Provide word bank for fill in the blank, limit the number of multiple choice.

Summative Assessments:

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

Examples:
Urbanization Test- Evaluating

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: do not make students write in complete sentences, provide extra time, work with students individually.

Urbanization Test: Limit the number of choices on multiple choice, provide cues to help students remember

specific activities pertaining to the question, provide larger versions of charts and graphs, do not have students make corrections on true/false, provide a word bank for the fill in the blank, have students choose a set number of the short answer to complete, do not make students write in complete sentences for the short answer, grade for content on short answer only.

Performance Assessments:

Students will be required to turn in homework, perform labs and create presentations utilizing either Powerpoint, Prezi or Google Slides.

Example:
Green Building Project - Creating

- examples of assessments and modified assessments are in the District Shared…..

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: do not make students write in complete sentences, provide extra time, work with students individually.

Green Building Project: Provide a list of websites to assist students in research, provide graphic organizers to assist students in organizing information, strategic grouping based on strengths and weaknesses of individual students in group, allow for extra time.

Unit 4: Water

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Environmental Science/ Water** **Grade Level(s): 11-12**	**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 urbanization and biodiversity and later units on energy and mineral resources, processes that shape the earth, and climate. The unit will begin with a discussion about the importance of the Earth's freshwater resources. The focus will start off on how much of the Earth's water is usable fresh water as opposed to salt water and where usable water can be found. Students will explore how water travels through a watershed and how it is stored as groundwater in aquifers. Although humans are not always conscious of it, our everyday activities have major effects on our freshwater resources. Freshwater resources are not distributed evenly through space or time. They are often used faster than groundwater stores can be replenished. Many areas around the globe are experiencing water shortages. Climate forecasts are predicting that this problem will continue. Conservation practices and new technologies are necessary for adapting to the global water crisis. Not only is water supply a concern but water quality is as well. The focus of the unit will shift to examine water pollution, its sources and its effects on both fresh water resources and marine ecosystems. The unit will culminate with a discussion about regulating activities that affect water resources and treating water.
Essential Question(s): 1. If the Earth has so much water, why do we have water shortages? 2. How do our actions affect the availability of water? 3. How does water pollution affect humans and ecosystems?	**Enduring Understanding(s):** 1. Due to the constant recycling of water through the hydrologic cycle fresh water is a renewable resource; however, it exists in limited quantities. Most of the water on Earth is salt water and is unusable for everyday needs. Human activities can disrupt the water cycle in an area. Activity in one section of a watershed can affect what the availability fresh water in other sections of a watershed. 2. Humans obtain water for most of their needs, including agriculture, personal activities, and industrial uses, from groundwater. Due to human activities groundwater is being used faster than it can be replenished. Conserving water is necessary to prevent groundwater depletion. 3. There are numerous types of water pollution including sediment pollution, thermal pollution, and chemical pollution. Contributors to water pollution can be categorized as point source or nonpoint source. Point source pollution is easier to prevent and control. Once water has been polluted it can take very long time to clean up. Even though

	humans rely on freshwater to meet their daily needs we need to be careful with our oceans as well as our fresh ground and surface waters because ocean ecosystems affect our ability to harvest food and climate among other things.

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 fresh water can be both renewable and limited. 2. Explain the significance of a watershed. 3. Explain the major causes and effects of groundwater depletion. 4. Describe strategies for addressing water depletion. 5. Distinguish between point source and nonpoint source pollution. 6. Explain why groundwater pollution is difficult to clean up. 7. Discuss the sources and effects of major pollutants found in the ocean. 8. Describe how water is regulated and treated.	**1. NGSS:** HS-ESS3-3.C **Other Content Areas:** RST.11-12.7, RST.11-12.9, WHST.11-12.4, SOC.9-12.6.6.12 E.1,3,6,8 **2. NGSS:** HS-ESS3-3.C **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10 **3. NGSS:** HS-ESS3-6 **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10, HSS-ID.A.1, SOC.9-12.6.6.12 E.6 **4. NGSS:** HS-ESS3-4.B, C **Other Content Areas:** RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10, SOC.9-12.6.6.12 E.6 **5. NGSS:** HS-ESS3-3.C **Other Content Areas**: RST.11-12.1, 2, 3, 4, 5, 9, 10, WHST.11-12.1, 2, 3, 4, 5, 9, 10, SOC.9-12.6.6.12 E.6 **6. NGSS:** HS-ESS3-4.C, HS-ETS1-1.B **Other Content Areas:**

	WHST.11-12.1,2,3,4, RST.11-12.7,9, SOC.9-12.6.6.12 E.6 **7. NGSS:** HS-ESS3-3.C, HS-LS2-6, HS-LS2-7 **Other Content Areas:** RST.11-12.7,9,HSS-ID.A.1, WHST.11-12.2 **8. NGSS:** HS-ESS3-4.C, HS-ETS1-1.B **Other Content Areas:** WHST.11-12.2,3,4, RST.11-12.7,9, SOC.9-12.6.6.12 E.6,

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, Social Studies, 21st Century Skills, and Language Arts. Students will be calculating percentages and creating and analyzing graphs, discussing environmental implications of societal practices and political decisions, and creating presentations using programs like Powerpoint, Prezi and Google Slides.

Examples:
Water Depletion PBL
Water pollution lab
Real Data activity from page 431 of Pearson, Environmental Science

- examples of strategies and modified strategies are in the District Shared\Science……

Accommodations/Modifications:

Water Depletion PBL- Provide graphic organizers to assist students in organizing research, provide a list to help student plan time wisely and stay on task, provide a list of difficult key terms that student may come across with definitions.
Water Pollution Lab: Monitor discussions and provide frequent feedback and leading questions, provide an example for calculations.
Real Data activity from page 431- provide students with a copy of workbook page 254, demonstrate how to set up proportions, work with students one on one.

Students will engage with the following text:

Environmental Science, Pearson. – Students will use designated sections of the text as a starting point for research into fresh water resources and how human activities affect freshwater resources and marine ecosystems.

Example:
14.2 Reading worksheet- Students will read chapter 14.2 in their textbook, use context clues to define key terms and reflect on reading to answer higher order questions.

EPA's website on Exploring Estuaries to research challenges currently facing estuaries due to human activities and answer follow up questions.
http://www.epa.gov/owow_keep/estuaries/kids/about/chlnges.htm

- examples of assessments and modified assessments are in the District Shared…..

Accommodation/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: do not make students write in complete sentences, provide extra time, work with students individually.

14.2 Reading: Allow students to work in pairs, reduce number of higher order questions student is required to answer, provide extra time, work with students one on one, reword questions.

Estuary Challenges Activity: monitor student progress providing frequent feedback and leading questions to assist students in coming up with answers.

Students will write:

In addition to warm ups, homework assignments and answers to lab follow up questions, students will write political action letters.

Example:
Watershed lab extension activity- Students will research current issues surrounding the Big Timber Creek watershed and write letters to local legislators asking for action.

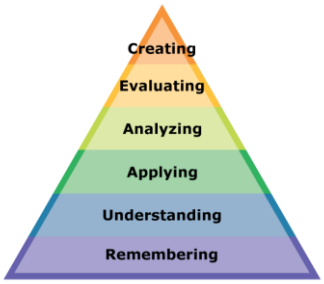
Accommodations/Modifications: Provide student with a graphic organizer or skeleton outline to help organize thoughts, pair students together for peer editing, modify grading rubric, do not grade student on spelling/grammar/mechanics, allow extra time.

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 information in the form of multimedia presentations including Powerpoint presentations and videos.
- 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.
- Students will create and utilize models to explore how water moves through a watershed.
- Students will engage the textbook, read articles and utilize the internet to research background information.
- Students will analyse data, and interpret graphs and diagrams.
- Students will collaborate in small groups to create presentations using Powerpoint, Prezi or Google Slides.
- Students will utilize computer simulations to learn about the sources and effects of major pollutants found in the ocean and answer questions.
- 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.
- Students could extend their knowledge by researching how GEMS landfill has affected the Big Timber Creek watershed and what has been done to clean up the groundwater.



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 warm ups, periodic quizzes, text based questions, participation in class discussions and writing assignments.

Examples:
Aquifer model lab- Analyze
14.1 Quiz- Applying
Real Data Activity from page 431 in textbook- Evaluating

- examples of assessments and modified assessments are in the District Shared…..

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.

Aquifer Model Lab: Make spaces for students to check off each direction as they complete them, give students an amount of time that each step should take to assist them with staying on task, provide a premade sketch of the aquifer in a cup for students to label.

14.1 Quiz: Provide a word bank for fill in the blank, do not make students write in complete sentences for the short answer.

Real Data activity from page 431: provide students with a copy of workbook page 254, demonstrate how to set up proportions, work with students one on one.

Summative Assessments:

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

Example:
Water Resources Test- Evaluating

- examples of assessments and modified assessments are in the District Shared…..

Accommodations/Modifications:

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

Water Resources Test: Reduce number of choices on multiple choice, do not make student correct true false, allow students to choose two short answer instead of doing all four

Performance Assessments:

Students will be required to turn in homework, perform labs and create presentations utilizing either Powerpoint, Prezi or Google Slides.

Examples:
Watershed modeling activity- Analyzing
Water pollution lab- Analyzing
West coast water shortage PBL- Create

- examples of assessments and modified assessments are in the District Shared…..

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 will not be limited to: alter grading rubric (example decrease value of spelling/grammar/punctuation for dyslexic students), work with students individually give students extra time to complete, work with students individually, assess comprehension and progress of students throughout completion of lab.

Water pollution lab- Monitor discussions and provide frequent feedback and leading questions, provide an example for calculations.
West coast water shortage PBL-Provide graphic organizers to assist students in organizing research, provide a list to help student plan time wisely and stay on task, provide a list of difficult key terms that student may come across with definitions.

Unit 5: Energy and Mineral Resources

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title:
Environmental Science/ Energy and Mineral Resources

Grade Level(s): 11-12</td><td>Unit Summary:
This unit will cover the types of energy and mineral resources available on Earth and focus on weighing the costs and benefits of resource extraction and utilization. The unit will begin with an exploration into the different energy resources currently available. 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. Students will discover that each energy resource has its own benefits and costs. Students will learn that green energy resources are dependent on mineral resources.
The focus will then shift to extraction of resources and costs and benefits associated with mineral extraction. The students will weight the costs and benefits of resource extraction and utilization and discuss ways to promote responsible consumption of resources.
The energy and mineral resources unit follows the units on biodiversity, water resources and the effects of urbanization. The flow of these four units is designed to give students an overall picture of how human consumption of resources affects the sustainability of Earth. Connections to this theme of sustainability will be made again later in the climate unit.</td></tr>
<tr><td>Essential Question(s):

1. Is it safe depend on any single energy resource to meet all of our needs?

2. How do we balance our needs for resources with the needs of the environment?

3. At what point does the cost of mining outweigh the benefits?</td><td>Enduring Understanding(s):

1. Every energy resource has its own unique set of benefits and drawbacks. It takes millions of years for fossil fuels to form and we will eventually run out if we continue to consume them at the current rate. Using fossil fuels contributes to air and water pollution and climate change. 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.

2. When resources are extracted and used without regulation the sustainability of resources is put in jeopardy. There can also be major environmental repercussions. Rules and laws must be set up to safeguard the welfare of the environment. Individuals need to monitor their own use of resources and make an effort to reuse and recycle materials.

3. There are numerous benefits to mining. The resources that are extracted from mines contribute to everyday needs, military defense systems, and technological advances in communication and computing. Mining also creates good paying jobs. However, the costs of mining cannot be overlooked. These costs include health problems, physical endangerment to human life, water and air pollution, and habitat destruction.</td></tr>
</table>

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 costs and benefits associated with different energy resources. **2.** Critique energy resources based on cost, safety, reliability, aesthetics, cultural effects and environmental effects. **3.** Weigh the costs and benefits of energy and mineral resource extraction methods including hydraulic fracturing and mining. **4.** Determine ways that mineral extraction and use can become more responsible.	**1. NGSS:** HS-ESS3-2.A **Other Content Areas:** RST.11-12.2, RST.11-12.4, RST.11-12.10, WHST.11-12.1, WHST.11-12.7, WHST.11-12.9, WORK.9-12.9.1.12.1, TEC.9-12.8.1.12 A.3, TEC.9-12.8.2.12 A.1, TEC.9-12.8.2.12 A.2 **2. NGSS:** HS-ESS3-2.B **Other Content Areas:** RST.11-12.2, RST.11-12.4, RST.11-12.10, WHST.11-12.1, WHST.11-12.7, WHST.11-12.9, WORK.9-12.9.1.12.1, Sl.11-12.1, TEC.9-12.8.1.12 A.3, TEC.9-12.8.2.12 A.1 **3. NGSS:** HS-ESS3-2.A,B **Other Content Areas:** RST.11-12.7, SL.8.1, SL.9-10.1, SL.11-12.1, RST.11-12.6, RST.11-12.9, WORK.9-12.9.1.12.1, WORK.9-12.9.1.12.2, WORK.9-12.9.1.12.F.5, WORK.9-12.9.2.12.B.1, WORK.9-12.9.2.12.E.4, SOC.9-12.6.2.12 D.4, SOC.9-12.6.2.12 E.4, SOC.9-12.6.2.12 E.5, SOC.9-12.6.2.12 E.6, Sl.11-12.1, TEC.9-12.8.1.12

	A.3, TEC.9-12.8.2.12 A.1 **4. NGSS:** HS-ESS3-2. A,B **Other Content Areas:** SL.8.1, SL.9-10.1, RST.11-12.6, SL.11-12.1,WORK.9-12.9.1.12.1, WORK.9-12.9.1.12.F.5, WORK.9-12.9.2.12.E.4, SOC.9-12.6.2.12 D.4, Sl.11-12.1

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, Social Studies, Language Arts and 21st Century Life and Careers. Students will be interacting with a variety of media types to learn about current events and issues surrounding resource extraction and utilization, writing persuasive essays, debating socio-political implications of technological advances, and utilizing spreadsheets to analyze costs and benefits associated with mineral extraction through mining.

Examples:
Energy Resources Writing Assignment
Rare Earth Minerals Video discussion
Cookie Mining Lab
Hydraulic fracturing video, article and discussion

- examples of strategies and modified strategies are in the District Shared\Science\....

Students will engage with the following text:

Environmental Science, Pearson. – Students will use designated sections of the text as a starting point for research into types of energy resources and mineral resource extraction methods.

Examples:

Pages 398- 404 about mining- Students will use what they have read to assist them in coming up with definitions for the key terms and completing the follow up questions.

Article "Researchers Devise a Simple Method for Recycling Rare Earth Magnets." - Students will read about current research from the University of Pennsylvania for developing a process to recycle rare earth metals and answer. After reading the article students will answer questions pertaining to the point of view of the text and the text structure designed to support students in a deeper understanding of the text.

- examples of strategies and modified strategies are in the District Shared...

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: do not make students write in complete sentences, provide extra time, work with students individually.

Pages 398-404: Allow students to work in pairs, go over correct answers on whiteboard or Smartboard.

Article "Researchers Devise a Simple Method for Recycling Rare Earth Magnets.": Provide students with highlighters, demonstrate how to read for meaning and annotate prior to setting students free to read on their own, provide students with a set of steps to follow when reading for meaning, work individually with students, provide a bank of difficult words with definitions prior to reading.

Students will write:

In addition to warm ups, homework assignments and answers to lab follow up questions, students will write persuasive arguments in the form of essays, letters, and speeches.

Examples:

Op-Ed letter- After reading pages 412-413 in the textbook presenting two sides to a debate over reopening a closed mine in Retsof, New York students will use what they know about the costs and benefits of mining and choose a side. They will write an Op-Ed letter that presents a sound argument to a hypothetical newspaper.

Energy Resources Writing Assignment- In this writing assignment students will be given choices for role, audience, format and topic. All of the choices require students to demonstrate an understanding of the costs and benefits associated with different energy resources and take a stance backed up by sound argument.

- examples of strategies and modified strategies are in the District Shared…

<u>Accommodations/Modifications</u>

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 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.

Op-Ed letter: provide graphic organizer for planning prior to writing, modify grading rubric, grade for content instead of mechanics/spelling/grammar, work individually with students, allow extra time, pair students up for peer editing.

Energy Resources Writing Assignment: provide graphic organizer for planning prior to writing, modify grading rubric, grade for content instead of mechanics/spelling/grammar, work individually with students, allow extra time, pair students up for peer editing.

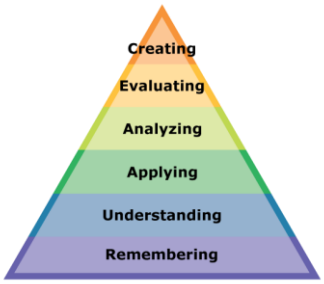
PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

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

- Students will engage the textbook to gather information about one energy resource and fill in a graphic organizer.
- Students will engage the textbook, read article, and utilize the internet to research information to research and discuss the benefits and costs of various energy resources.
- 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.
- Students will participate in a short structured debates.
- Information will be presented to the students in the form of multimedia presentations including graphics and videos.
- Students will participate in a Socratic Seminar type discussion about balancing the economic, social, political, and environmental costs and benefits associated with mining.
- The students might expand upon concepts by reading articles or visiting web pages that explore developments in "green" technologies.
- 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.

- examples of strategies and modified strategies are in the District Shared...



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 warm ups, periodic quizzes, text based questions, participation in class discussions and writing assignments.

Example:

1. Energy Resource Quiz- Understanding
3. Text based questions to go along with pages 398-404 in Pearson Environmental Science- Applying
4. Rare Earth Mineral Resources Discussion- Evaluating
4. Retsof, New York Op-Ed letter- Evaluating

- examples of assessments and modified assessments are in the District Shared…..

Accommodations/Modifications:

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.

Energy Resources Quiz: allow students to use graphic organizers from group activity, have students choose 3 or 2 resources instead of 4.

Text based questions on pages 398-404: photocopy pages in textbook and give students reading materials in advance so they can pre-read, highlight, and ask questions, allow students to work in pairs on higher order questions, to reduce number of questions give students a number of higher order questions to from which to choose, go over all correct responses together as a class with answers recorded on the whiteboard or Smartboard.

Rare Earth Mineral Resources Discussion: provide students with discussion questions, link to video and a graphic organizer prior to showing the video in class, model good note taking on whiteboard or Smartboard during discussion, talk to students who are not comfortable talking in front of class ahead of time, provide them with

one specific question that they will be asked to comment on so that they can be prepared with an answer they are confident with, after discussion provide a copy of notes.

For <u>Retsof, New York Op-Ed Letter</u>: provide graphic organizer to assist students in organizing thoughts, allow students to work in pairs, pair students for peer editing.

<u>Summative Assessments</u>:

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

Example:
Energy and Mineral Resources Test - Evaluating

- examples of assessments and modified assessments are in the District Shared…..

<u>Accommodations/Modifications</u>:

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

<u>Energy and Mineral Resources Test</u>: chunk test, reduce multiple choice answers to 3 instead of 4, bold, underline or italicize keywords in questions, provide cues alongside questions to aid students in recalling an activity related to the question, do not require students to change words on true/false, have students choose 1 open ended to answer.

<u>Performance Assessments:</u>

Students will be required to turn in homework, perform labs and write persuasive arguments based on the material in this unit.

Example:
3. Cookie Mining Lab- Analyze
1. Energy Resource Writing Assignment- Evaluating

- examples of assessments and modified assessments are in the District Shared…..

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 will not be limited to: alter grading rubric (example decrease value of spelling/grammar/punctuation for dyslexic students), work with students individually give students extra time to complete, work with students individually, assess comprehension and progress of students throughout completion of lab.

Cooking Mining Lab: do not make students answer questions in complete sentences, allow students to work in pairs when answering questions, check for understanding throughout activity, demonstrate how to fill out mining record sheet on Smartboard, provide area to check off steps of procedure as they are completed.
Energy Resource Writing Assignment: provide graphic organizer for planning prior to writing, modify grading rubric, grade for content instead of mechanics/spelling/grammar, work individually with students, allow extra time, pair students up for peer editing.

Unit 6: Processes that Shape the Earth

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Environmental Science/Processes that shape the Earth	**Unit Summary**: This unit will discuss various ways in which Earth's surface is changed and how those changes can affect human populations. The unit will begin with the basics of plate tectonics and how Earth's plate move over time creating various surface features. The unit will then move into the natural disasters that can happen due to plate tectonics and the effect that they have on human populations. This will allow the students the chance to explore and create disaster management plans. The unit will then move into water and how it shapes Earth's surface through erosion. The students will see examples on a short term scale, a flash flood, and a long term scale, the creation of the grand canyon. Then the unit will move into the factors that alter the rate in which erosion takes place. This is where the urbanization unit will tie in, to see how humans are altering erosion patterns. To end the unit, it will culminate in a section on Earth History that will show how the Earth has evolved during its history. This will show how Earth began as a lifeless, barren, planet and how life was able to evolve and become complex over time. The climate unit will be tied in to show how Earth's climate has changed over time.
Grade Level(s): 11-12	

Essential Question(s): 1. How do Earth's plates move creating features on Earth's surface? 2. How can you use mid ocean ridges and continental crust as evidence for plate movement? 3. How do natural hazards affect human activity? 4. How can water shape the Earth's surface features? 5. What factors affect the rate in which erosion takes place? 6. How did the Earth form and evolve over time?	**Enduring Understanding(s):** 1. Earth's plates are continuously being moved through convection currents, creating a various features on Earth's surface. This movement has changed the locations of continents creating and destroying super continents throughout Earth's history and will continue to do so. Along with this, plate tectonics creates features on Earth such as mountains, valleys, and volcanoes; the feature created will be determined by the plates involved and the movement taking place. 2. Mid ocean ridges and continental crust are useful for evidence of plate tectonics. When continental plates diverge, magma will be forced up through the trench that forms. This magma will create new rock and sea floor, while the older rock will be found at the continental crust. Within this rock on the seafloor, magnetic reversals will be present from the Earth's magnetic poles switching over time. 3. Natural hazards, including earthquakes, tsunamis, volcanic eruptions, and typhoons have significant impact on human populations which can be extremely devastating. When a natural disaster takes place many people lose their homes and communities, there is an increased risk of disease with tsunamis and typhoons due to waterborne bacteria, and due to lost crops and food supplies there can be widespread hunger. 4. Water moving across the earth in streams and rivers pushes along soil and breaks down pieces of rock in a process called erosion. The moving water carries away rock and soil from some areas and deposits them in other areas, creating new landforms or changing the course of a stream or river. This process generally takes a long time, an example of this is the Grand Canyon. 5. The amount of erosion in an area, is affected by the amount of moving water, the speed of the moving water, and by how much vegetation covers the area. 6. The Earth is a continually evolving object that has changed many times throughout it's history and will continue to do so. The history of Earth can be broken down using the geologic time scale, with each time period having unique characteristics and events that took place. In the beginning Earth was uninhabitable with extremely high temperatures and lacking oxygen; cyanobacteria was then responsible for creating an oxygen rich atmosphere which allowed life as we know it to evolve.

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 how convection currents drive plate tectonics. 2. Explain how the movement of Earth's plates leads to the features on Earth's surface. 3. Use ages of oceanic crust with increasing distance from mid-ocean ridges and the ages of North American continental crust as evidence for plate movement. 4. Construct an explanation based on evidence that shows how natural hazards have influences human activity. 5. Identify unique chemical and physical properties of water that cause it to have an impact on the planet. 6. Describe the role of water in physical and chemical weathering. 7. Determine how moisture affects the ease in which soil is eroded 8. Explain how a lack of vegetation can lead to soil erosion. 9. Describe how water has contributed to the formation of Earth's surface features. 10. Use evidence from radioactive dating and composition of other objects in the solar system to develop an account of Earth's formation and early history. 11. Describe the simultaneous coevolution of Earth's system and life on Earth.	**1. NJSS:** HS-ESS2-1.A,B, **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **2. NJSS:** HS-ESS2-1.A,B **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **3. NJSS:** HS-ESS1-5.B **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **4. NJSS:** HS-ESS3-1.B **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, 3, B.1, C.4, F.2 **5. NJSS:** HS-ESS2-5.C **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **6. NJSS:** HS-ESS2-5.C **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4,

	7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **7. NJSS:** HS-ESS2-2.A, HS-ESS2-5.C **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, B.1, C.4, F.2 **8. NJSS:** HS-ESS2-2.A **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **9. NJSS:** HS-ESS2-1.A,B **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **10. NJSS:** HS-ESS1-6.C, HS-PS1.C **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, B.1, C.4, **11. NJSS:** HS-ESS2-7.D,E **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, B.1, C.4, F.2

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, Social Studies, 21st Century Skills, and Language Arts. Students will be calculating percentages and creating and analyzing graphs, discussing environmental implications of societal practices and political decisions, and creating presentations using programs like PowerPoint, Prezi and Google Slides.

Examples:
Natural Disaster Project
Absolute Dating Lab

- examples of strategies and modified strategies are in the District Shared\Science...

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: do not make students write in complete sentences, provide extra time, work with students individually.

Natural Disaster Project: List of websites that contain relevant information, graphic organizers to keep information collected organized, frequent feedback, extended time

Absolute Dating Lab: Small groups based on student ability level so extra support can be provided by instructors, modeling of the math and graphing involved, extra time if needed

Students will engage with the following text:

Environmental Science, Pearson. – Students will use designated sections of the text as a starting point for research into environmental effects of of weathering and erosion, various ways humans are increasing and can prevent erosion, and the problems that it can cause.

Earth Science, Glenco. - Students will use designated sections of the text as a starting point for research into plate tectonics, how this process shapes the Earth's surface, and how human response to natural hazards.

National Geographic Natural Disaster Data Sheets: The students will read various data sheets containing information about natural disasters and the impact on humans.

Students will write:

In addition to warm ups, homework assignments and answers to lab follow up questions, students will write persuasive arguments and create presentations using Powerpoint, Prezi or Google Slides.

Example:

Earth history project
Natural Disaster Project

- examples of strategies and modified strategies are in the District Shared\Science…

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: do not make students write in complete sentences, provide extra time, work with students individually.

Earth History Project: Students will receive frequent feedback, ono on one help from instructors, medeling of expectations.

Natural Disaster project: Students will receive a template for their brochure, frequent feedback, graphic organizers to manage the information they research

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

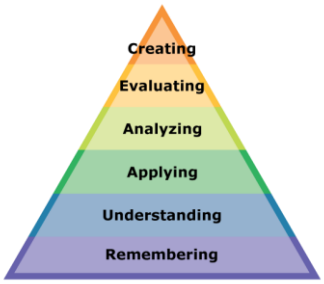
<u>How</u> will students uncover content and build skills.

- Students will analyse data, and interpret graphs and diagrams.
- Information will be presented to Students in the forms of multimedia presentations including videos and slide presentations.
- Students will work with stream tables to simulate erosion and to evaluate various factors that affect it.
- 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.
- Students will be presented information in the form of multimedia presentations including Powerpoint presentations and videos.
- Students will engage the textbook, read articles and utilize the internet to research background information.
- Students will complete research using the internet to compile the information needed to develop a response plan for natural disasters

- examples of strategies and modified strategies are in the District Shared\Science...

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 warm ups, periodic quizzes, text based questions, participation in class discussions and writing assignments.

Examples:

Earth history project - Evaluating
Natural Disaster Project - Creating
Plate tectonics quiz - Applying

- examples of strategies and modified strategies are in the District Shared\Science…

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: do not make students write in complete sentences, provide extra time, work with students individually.

Examples:

Earth History Project: Students will receive frequent feedback, ono on one help from instructors, medeling of expectations.

Natural Disaster project: Students will receive a template for their brochure, frequent feedback, graphic organizers to manage the information they research

Plate Tectonics Quiz: Provide word bank for fill in the blank, limit the number of multiple choice, grouping questions, additional time, bolding and underlining keywords.

Summative Assessments:

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

Example:Processes that shape the Earth test - Evaluating

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: do not make students write in complete sentences, provide extra time, work with students individually.

Example:

Processes that shape the Earth test: Limit the number of choices on multiple choice, provide cues to help students remember specific activities pertaining to the question, provide larger versions of charts and graphs, do not have students make corrections on true/false, provide a word bank for the fill in the blank, have students choose a set number of the short answer to complete, do not make students write in complete sentences for the short answer, grade for content on short answer only, bold and underline key words, fewer multiple choice answers to pick from, additional time.

Performance Assessments:

Students will be required to turn in homework, perform labs and create presentations utilizing either Powerpoint, Prezi or Google Slides.

Example:

Erosion Lab - Analyze

- examples of assessments and modified assessments are in the District Shared…..

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: do not make students write in complete sentences, provide extra time, work with students individually.

Example:

Erosion Lab: Additional time to complete the lab and/or assessment questions, Heterogenous lab groups for additional peer support, model how to complete the chart and analyze findings.

Unit 7: Climate

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Environmental Science/Climate **Grade Level(s): 11-12**	**Unit Summary**: This unit will discuss what climate is and the various factors which affect it. This unit will begin with the students getting a basic understanding of the difference between weather and climate; once this is established the students will review the water cycle and will get an indepth look at the carbon cycle and how extreme amounts of carbon are being added to the cycle, thus tying in the urbanization unit. The shift will then move from learning the individual pieces, to putting them all together to see the big picture of climate change. There are many natural reasons for climate change, such as, the change in the shape of Earth's orbit, the tilt of Earth's axis, the reflectivity of the atmosphere, and the amount of solar radiation the sun gives off. The other factors that affect climate are manmade, such as the excess amounts of carbon dioxide being released into the atmosphere from cars, deforestation, factories, and burning fossil fuels. The unit will then move onto the effects that have been and will continue to be seen. Many organisms are being affected by the climate not being habitable anymore. Due to this, animals will have different nesting, breeding, and migration patterns, which may cause them to be unable to obtain their food source. Various plants are unable to grow do to changing temperatures and precipitation patterns; these plants are moving to higher latitudes or elevations in order to be in the correct environment. Our oceans are becoming too warm and acidic, causing marine ecosystems to collapse. In order to create a more personal connection, we will end the unit with how humans are and will be affected by climate change and how people can help. We will cover how people are losing their livelihood, coastal regions will be destroyed, and drinkable water sources will be reduced.
Essential Question(s): 1. **What factors affect how the sun warms the Earth?** 2. **How is climate affected by land formations, bodies of water, and changes to Earth's orbit and tilt?** 3. **What is evidence for climate change and the probable causes?** 4. **In which ways is the warming of the atmosphere affecting ecosystems and**	**Enduring Understanding(s):** 1. The amount of energy that the Earth receives from the sun can be altered by numerous factors that can either be natural or man made. Some natural factors that can affect the amount of solar radiation received is the how much solar radiation is being reflected by Earth and it's atmosphere, the greenhouse effect, and variations in the output of energy coming from the sun. An example of a man made variation is the increasing greenhouse effect that is caused by humans releasing large quantities of carbon dioxide into the atmosphere, causing it to absorb more energy. 2. Climate can also be affected by factors such as land formations, bodies of water, and changes to Earth's tilt and orbit. Land formations such as mountains, can create a rain shadow effect; this is where one side of

organisms? **5. How is climate change affecting people?**	the mountain will have cool, moist air coming off of a body of water, which will force precipitation to take place on one side of the mountain. As a result, the other side of the mountain will receive dry, warm air and will have a desert like climate. Large bodies of water can create moist air, cooler summers, and warmer winters for the surrounding areas. Changes in climate can also be caused by Earth's orbit around the sun; the orbit changes shape over long period of time, which alters the Earth's distance from the sun, as well as the tilt of the axis changing the angle at which the sun's rays hit the Earth, therefore, the amount of solar radiation received. 3. The climate on Earth has changed many times throughout its history for various reasons. Our climate cycles in and out of glacial and interglacial period naturally. One of the most notable climate changes is the one that took place at the end of the Paleozoic Era when the dinosaurs went extinct; where through a series of events the Earth was plunged into a ice age. More recently, our climate is being altered by humans releasing excessive amounts of carbon dioxide into the atmosphere through our overuse of fossil fuels. One place where we can view evidence of these changes is in ice cores. The cores show a record of the concentration of carbon dioxide and deuterium in our atmosphere. 4. The warming of the atmosphere can have great effects on ecosystems and organisms. With temperatures, on average, becoming warmer, organisms are migrating to higher altitudes and latitudes in order to be in cooler climates. Birds are experiencing earlier nesting patterns due to warmer temperatures, which triggers them to nest. This can put them in danger of not having a large enough food supply if their migrating patterns are altered. Marine ecosystems are also being severely damaged by the ocean becoming more acidic and temperatures warmer. 5. Climate change is and will continue to greatly affect humans. Due to increased temperatures and altered precipitation patterns, there have been droughts which reduce crop yields. If crop yields are low, we will face a decreased food supply, lower profits for farmers, and increased food costs. With increased temperatures melting polar ice caps, the sea levels are rising and will continue to do so. When sea levels rise high enough, beaches will become flooded and shore town economies will suffer without the money brought in by tourists. Another impact of ice caps melting is the decreased fresh water supply for humans; once the fresh and saltwater mix, it will become unusable for human consumption.

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 factors that affect how the sun warms the Earth. 2. Explain what happens when the sun's rays enter Earth's atmosphere. 3. Explain the function of the greenhouse effect and it's connection to climate change. 4. Evaluate, using models, how natural variations in sun's intensity and the Earth's tilt and orbit have affected the amount of solar energy received has altered Earth's climate. 5. Describe how natural events on Earth's surface can alter climate. 6. Evaluate the time scale on which various events affect the climate and the impact that it is having on the Earth. 7. Create and describe a carbon cycle to demonstrate how carbon cycles in environments and how human activities can increase carbon dioxide concentrations. 8. Use evidence to show how climate change influences human activity and affects populations. 9. Analyze data that shows the impact of climate change on the Earth. 10. Use published computational representation to demonstrate how human activities are altering the spheres on Earth.	**1. NJSS:** HS-ESS2-2.D **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **2. NJSS:** HS-ESS2-2.D **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **3. NJSS:** HS-ESS2-2.A, HS-ESS2-4.A **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **4. NJSS:** HS-ESS2-4.A, B **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **5. NJSS:** HS-ESS2-4.A, HS-LS1-5 **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **6. NJSS:** HS-ESS2-2.A, B, D **Other content areas:**

	RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **7. NJSS:** HS-ESS2-6.D, HS-LS1-5, HS-LS2-4, HS-LS2-5.B, D, HS-LS4-6, ETS1.B **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, C.4, F.2 **8. NJSS:** HS-ESS3-1.B, HS-LS2-2 **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, 3, B.1, 2, C.4, F.2 **9. NJSS:** HS-ESS3-5.D **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, 3, B.1, 2, C.4, F.2 **10. NJSS:** HS-ESS3-6.D, 2.D, HS-LS2-7.C, ETS1.B, HS-LS4-6, TEC.9-12.8.1.12 A.5, TEC.9-12.8.2.12 A.2, **Other content areas:** RST.11-12.1, 2, 3, 4, 5, 6, 7, WHST.11-12.1,4, 7,10, HSS-ID.A 1, 2, 3, 5, 6, 9, WORK.9-12.9.1.12.A.1, 2, 3, B.1, 2, 3, C.4, E.1, 2, F.2, TEC.9-12.8.1.12 A.5, TEC.9-12.8.2.12 A.2,

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, Social Studies, 21st Century Skills, and Language Arts. Students will be calculating percentages and creating and analyzing graphs, discussing environmental implications of societal practices and political decisions, and creating presentations using programs like Powerpoint, Prezi and Google Slides.

Examples:
Climate clues
Carbon Cycle Activity
Greenhouse gas simulation
Achoo Lab
Human impact on Earth's spheres project

- examples of strategies and modified strategies are in the District Shared\Science...

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: do not make students write in complete sentences, provide extra time, work with students individually.

Climate Clues: Copies of the article so students can highlight key points, individual help from instructors

Carbon Cycle: Provide a template for the cycle and list of key terms that will be useful, one on one help from instructors

Greenhouse Simulation: one on one help from instructors, modeling math involved

Achoo Lab: Limited number of graphs to analyze, grouping students by ability to allow extra support to be more easily available, model how to analyze graphs

Human Impact Project: List of websites that contain relevant information, graphic organizers to keep information collected organized, frequent feedback

Students will engage with the following text:

Environmental Science, Pearson. – Students will use designated sections of the text as a starting point for research into environmental effects of of the greenhouse effect, various ways humans are amplifying this effect, and the problems that it can cause.

Web resources- Students will use web resources to research climate change and the affects it has on the environment, organisms, and humans.

Example:

Climate Clues: Students will read "Climate Clues in Ice" on pages 508-509 in their textbook to gather more information on how ice cores are used to study past climates. They will then use this information to answer

questions to check for understanding and for the students to apply what they know and make a prediction about future climates based on the data provided.

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: do not make students write in complete sentences, provide extra time, work with students individually.

Climate Clues: Copies of the article so students can highlight key points, individual help from instructors

Students will write:

In addition to warm ups, homework assignments and answers to lab follow up questions, students will write persuasive arguments and create presentations using Powerpoint, Prezi or Google Slides.

Examples:

Climate Clues:
After reading the article, the students will be asked to write a prediction on climate based on the evidence that has been found in ice cores about past climates.

Carbon cycle activity": In addition to drawing out the carbon cycle, the students will have to explain in writing how carbon cycles through the environment and how humans are increasing the amount of Carbon that is released into the atmosphere and how this amplifies the greenhouse effect.

- examples of strategies and modified strategies are in the District Shared\Science…

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: do not make students write in complete sentences, provide extra time, work with students individually.

Climate Clues: The students will receive copies of the article so they can highlight key information, working in pairs, one on one help from instructors

Carbon cycle: Provide a template for the cycle and list of key terms that will be useful, one on one help from instructors

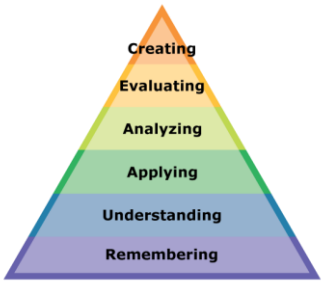
PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

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

- Students will engage the textbook and analyze graphs and data to understand the greenhouse effect and how humans are amplifying the effect to cause climate change
- Students will engage in small and large group discussions about climate change and how it affects humans and populations.
- Information will be presented to Students in the forms of multimedia presentations including videos and slide presentations.
- Students will use the internet to research climate change and determine the effects and propose possible solutions.
- Students will analyse data, and interpret graphs and diagrams.
- 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.
- Students will work with online simulations to demonstrate climate change and how the atmosphere is changing.

- examples of strategies and modified strategies are in the District Shared\Science...



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 warm ups, periodic quizzes, text based questions, participation in class discussions and writing assignments.

Examples:

16.1 Reading Questions- Evaluating
16.3 Quiz- Applying
Climate Clues Reading - Evaluating

- examples of assessments and modified assessments are in the District Shared…..

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: do not make students write in complete sentences, provide extra time, work with students individually.

Examples:
16.1 Reading questions: Give students a set number of higher order questions to choose from instead of having them answer all higher order questions, do not make students answer follow up questions in complete sentences, allow students to work in pairs.

16.3 Quiz: Provide word bank for fill in the blank, limit the number of multiple choice, grouping questions, additional time, bolding and underlining keywords.

Climate Clues: Additional time, copies of the article so students can highlight and make notes in the reading.

Summative Assessments:

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

Example:Climate Test - Evaluating

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: do not make students write in complete sentences, provide extra time, work with students individually.

Example:
Climate Test: Limit the number of choices on multiple choice, provide cues to help students remember specific activities pertaining to the question, provide larger versions of charts and graphs, do not have students make corrections on true/false, provide a word bank for the fill in the blank, have students choose a set number of the short answer to complete, do not make students write in complete sentences for the short answer, grade for content on short answer only, bold and underline key words, fewer multiple choice answers to pick from, additional time.

Performance Assessments:

Students will be required to turn in homework, perform labs and create presentations utilizing either Powerpoint, Prezi or Google Slides.

Example:Carbon Cycle Activity

- examples of assessments and modified assessments are in the District Shared…..

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: do not make students write in complete sentences, provide extra time, work with students individually.

Example:

Carbon Cycle Project: Provide a list of websites to assist students in research, provide graphic organizers to assist students in organizing information, strategic grouping based on strengths and weaknesses of individual students in group, allowing students to work individually if they feel more comfortable, allow for extra time.

Unit 8: Atronomy

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Environmental Science/ Astronomy **Grade Level(s):** 11-12	**Unit Summary**: This unit concludes the course with an exploration of current space science and technology and a reflection of Earth's place in the universe and its characteristics in comparison to other objects in our solar system. Such characteristics make it uniquely suited to sustaining life. This distinction offers another perspective on the importance of protecting the natural environment. The unit begins with an overview of the organization of the universe based on the formation and activities of stars. The force of gravity is fundamental to understanding the vastness of space and the uniqueness of celestial objects. Thus, students will learn how elements are formed in stars, leading to the resources found here on Earth. They will also understand the orbits of objects like planets and moons to gain a clearer understanding of space exploration and eventual travel. Current space exploration technologies, and their impact on society, will be highlighted in this unit. Students will develop an appreciation for the search for extraterrestrial life and the potential to colonize other objects in the solar system for human habitation or resource extraction.
Essential Question(s): How old is the Sun, and how long will it persist? How did the universe originate and, how do we know? Where did the elements found in nature come from? How do we explain the motion of the planets around the Sun? What is the significance of recent discoveries about objects such as Pluto and Mars? What is the focus of current space science?	**Enduring Understanding(s):** Like other stars, the Sun formed from a nebula of gas and dust. It is a middle-sized, middle-aged star that undergoes nuclear fusion to give off various types of electromagnetic radiation, including the light and heat that is the source of energy for all life on Earth. It will continue to do so for five billion years. Astronomical evidence such as the cosmic background radiation and the red shift support the Big Bang theory, which describes the origin of the universe. Following the formation of clouds hydrogen that condensed to form the first stars, the universe has evolved to contain hundreds of billions of galaxies, which contain hundreds of billions of stars. Each star is a potential solar system. Hydrogen atoms that formed following the Big Bang fuses in nuclear reactions in stars, giving rise to helium, and successive nuclear fusion led to the formation of the elements found in nature. Gravity explains the orbits of smaller bodies such as moons around planets, and planets around stars. These orbits can be calculated to confidently predict their positions. We can apply Newtonian physics and tangible mathematics to sophisticated scenarios like space travel and astronomical observation of meteors, asteroids, and planets. Recent discoveries about Pluto, Mars and other bodies have expanded our

	understanding of the objects in our solar system, the diversity of other possible worlds, and the mechanisms that govern our own planet. Data is constantly being sent back from probes and rovers that offer insight into planets and other objects. We can analyze and interpret data that allows us to describe distant exoplanets. Current space science seeks to find life elsewhere in the cosmos, to evaluate the potential for humans to colonize other planets, and the possibility to extract resources from objects such as asteroids and moons. New technologies and missions emerge from the private sector and international space agencies in conjunction with NASA, signaling a new era of innovation, entrepreneurship, and collaboration.

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	**1. NGSS:** HS-ESS1-1 **Other Content Areas:** RST.11-12.2, RST.11-12.4, RST.11-12.10, **2. NGSS:** HS-ESS-1,3 **Other Content Areas:** RST.11-12.2, RST.11-12.4, RST.11-12.10, **3. NGSS:** HS-ESS-1-2 **Other Content Areas:** RST.11-12.2, RST.11-12.4, RST.11-12.10, **4. NGSS:** HS-ESS-1-4 **5. NGSS:** HS-ETS1-3 Other Content Areas: RST.11-12.2, RST.11-12.4, RST.11-12.10, WHST.11-12.1, WHST.11-12.7, WHST.11-12.9, WORK.9-12.9.1.12.1, TEC.9-12.8.1.12 A.3, TEC.9-12.8.2.12 A.1, TEC.9-12.8.2.12 A.2
1. Create a model that illustrates the ten-billion year life cycle of the Sun 2. Create a model to explain the production of higher elements and energy through nuclear fusion in stars. 3. Construct an explanation of the Big Bang theory based on astronomical evidence. 4. Use mathematical or computational models to predict the motion of orbiting objects in the solar system 5. Evaluate the state of the space program missions such as human habitation, planetary exploration, and the search for extraterrestrial life	

Inter-Disciplinary Connections:

Material presented in this section will connect with material in Math, Social Studies, 21st Century Skills, and Language Arts.
Students will apply appropriate mathematical and algebraic concepts to seek patterns in empirical data.
They will discuss the societal, economic, and political tradeoffs of the American space program, and create presentations using programs like PowerPoint, Prezi, and Google Slides. The study of our understanding of the universe and solar system will build on historical conceptions of cosmology and astronomy.

Students will engage with the following text:

Earth Science, Glencoe.
Students will use designated excerpts from Chapters 24-27 to define key terms and concepts, to stimulate discussion, and to inspire topics for further exploration. Supplementary texts will be collected from the most current sources available.

Excerpts from science fiction stories (such as “All Summer in a Day” and “The Space Merchants”) may also be implemented.

Students will write:

Students will use Cornell note-taking strategies when collect textual information, write responses to warm-up questions and answer conclusion questions in labs. Literacy strategies may also include “Think, Pair & Share,” summaries/abstracts of current events articles, position papers, and reflective journal entries.

Examples of strategies and modified strategies are in the District Shared\Science...

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will be presented information in the form of guided reading and multimedia presentations such as PowerPoint presentations and videos.

Guest speakers may also be available for presentations and Q&A.

The teacher will lead whole class discussions and facilitate small group discussions by monitoring student input and asking questions to elicit student prior knowledge and expand conversation, and provide concrete examples to emphasize real world relevance.

Students will use, analyze, and modify models to explore the evolution of the universe and the structure of the solar system, including the orbits of the planets.

Students will read and take notes through various strategies. Sources include the textbook, and supplementary articles. These articles can be supplied by the teacher, or approved by the teacher once found by the student.

Students will collaborate in small groups to gather information, and analyze and interpret relevant data and textual evidence provided by the teacher.

The teacher will guide whole class and small group discussions by monitoring student input and asking questions to elicit student prior knowledge and expand conversation, and provide concrete examples to emphasize real world relevance.

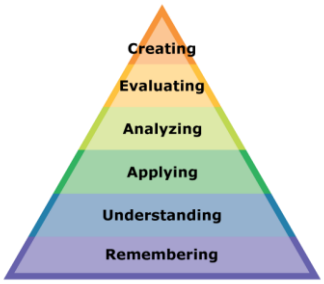
Students will extend their knowledge by debating the value of the modern space program.

Examples of strategies and modified strategies are in the District Shared\Science...

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 lab conclusion questions.

These assessments can be conducted during instruction, at the end of the period, or at the beginning of a successive class period. (Remembering through Applying)

Examples of strategies and modified strategies are in the District Shared\Science...

Accommodations/Modifications:

Accommodations and/or modifications will be made in accordance with individual student needs. These may include but not be limited to: chunking text, providing extra time, and working with students individually.

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)

Examples of strategies and modified strategies are in the District Shared\Science...

Accommodations/Modifications:

Accommodations and/or modifications will be made in accordance with individual student needs. These may include but not be limited to: chunking text, providing extra time, and working with students individually.

Performance Assessments:

Performance assessments include poster presentations on specific discoveries, papers in which students defend or develop policies for NASA, and case study analyses. (Remembering through Creating)

Students can investigate planetary motion using simulations such as those found at the following websites (Remembering through Evaluating):

http://lasp.colorado.edu/education/outerplanets/orbit_simulator/
http://galileoandeinstein.physics.virginia.edu/more_stuff/flashlets/kepler6.htm
http://phet.colorado.edu

Examples of strategies and modified strategies are in the District Shared\Science...

Accommodations/Modifications:

Accommodations and/or modifications will be made in accordance with individual student needs. These may include but not be limited to: chunking text, providing extra time, and working with students individually.

Black Horse Pike Regional School District
Highland Timber Creek Triton
Science Department
Syllabus
Environmental Science

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/October: **Introduction to Environmental Science (HS-ESS3-1, 3, 4, HS-ESS2-1, 2, 3, 6, HS-ETS1-1, 3, 4)**

- Identify ways to promote sustainability of resources.
- Describe ways that Earth's systems interact.
- Describe the theory of plate tectonics.
- Explain how the law of conservation of matter applies to the behavior of nutrients in the environment.

October/November: **Biodiversity (HS-ESS3-3)**

- Describe the economic benefits of biodiversity and explain ways in which biodiversity varies across groups or geography.
- List the major causes of biodiversity loss and describe strategies for maintaining biodiversity in ecosystems.

December: **Urbanization (HS-ESS3-3, 4, HS-ETS1-1)**

- Describe how different types of human societies impact their environment and the environmental impacts of urbanization.
- Differentiate between land cover and land use, and describe how people affect both and explain the impacts sprawl has on an area.
- Differentiate between green buildings and conventional buildings and discuss the progress toward sustainability some cities have made and its importance to the world.

January: **Water Resources (HS-ESS3-3, 4, 6, HS-ETS1-1)**

- Discuss how fresh water can be both renewable and limited.
- Explain the significance of a watershed.
- Explain the major causes and effects of ground water depletion and describe strategies for addressing it.

- Distinguish between point source and nonpoint source pollution and explain why groundwater pollution is difficult to clean up.
- Discuss the sources and effects of major pollutants found in the ocean.
- Describe how water is regulated and treated.

***February*: Energy and Mineral Resources (HS-ESS3-2)**

- Identify the costs and benefits associated with different energy resources.
- Critique energy resources based on cost, safety, reliability, aesthetics, cultural effects and environmental effects.
- Weigh the costs and benefits of mining and explain how mining is regulated.
- Describe ways that mineral use can become more responsible.

***March:* Processes that Shape the Earth (**HS-ESS1-5, 6, HS-ESS2-1, 2, 5, HS-ESS3-1)

- Explain how convection currents drive plate tectonics and how the movement of Earth's plates leads to the features on Earth's surface.
- Construct an explanation based on evidence that shows how natural hazards have influenced human activity.
- Identify unique chemical and physical properties of water that cause it to have an impact on the planet and describe the role of water in physical and chemical weathering and the formation of Earth's surface features.
- Use evidence from radioactive dating and composition of other objects in the solar system to develop an account of Earth's formation and early history.

***April/May:* Climate (HS-ESS2-2, 4, 6, HS-ESS3-1, 5, 6,)**

- Describe factors that affect how the sun warms Earth and explain what happens to the sun's rays after they enter the Earth's atmosphere.
- Explain the function of the greenhouse effect and its connection to global warming.
- Discuss natural and human causes of climate change.

***June:* Astronomy (HS-ESS1-1, 2, 3, 4)**

- Explain how the sun gets its energy and create a model based on evidence to illustrate its lifespan.
- Describe the Big Bang Theory and explain how light spectra, motion of galaxies and the composition of the universe provide evidence for the theory.
- Explain the role that stars play in the creation of elements.
- Use Kepler's laws to describe and predict the motion of orbiting objects.

Course Expectations & Skills

1. Create and maintain a class notebook
2. Write expository pieces such as opinion papers
3. Produce creative projects such as power point presentations and posters to generate public awareness about issues facing society
4. Work collaboratively on activities such as inquiry-based experiments and group presentations

Textbook

Environmental Science published by Pearson: Copyright: 2011

Grading Policy

Major Assessments: 40%
Minor Assessments: 10%
Labs: 30%
Practice:20%