NEW MILFORD PUBLIC SCHOOLS
New Milford, Connecticut

Integrated Science- College Prep.

BOE Approved 04-18-2017

New Milford Board of Education

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New Milford's Mission Statement

The mission of the New Milford Public Schools, a collaborative partnership of students, educators, family and community, is to prepare each and every student to compete and excel in an ever-changing world, embrace challenges with vigor, respect and appreciate the worth of every human being, and contribute to society by providing effective instruction and dynamic curriculum, offering a wide range of valuable experiences, and inspiring students to pursue their dreams and aspirations.

Course Overview

The Integrated Science course involves the study of major earth science concepts with an emphasis on the environment. Areas of study include properties of stars, the Big Bang, cycling of matter, tectonic process and earth history, pollution, energy sources and resource management. Science process skills and inquiry are stressed throughout. Students are encouraged to consider the real-world application of earth science concepts. Study skills and organizational ability are stressed by means of reading assignments, homework, modeling, lab reports, and group discussions.

Pacing Guide

Unit Title	# of Weeks
Unit 1: Space Systems	5
Unit 2: History of Earth	5
Unit 3: Earth's Systems	9
Unit 4: Weather and Climate	9
Unit 5: Human Impact and Sustainability	8

New Milford Public Schools

Committee Member(s): Ethan Saldana and Danielle Ragonnet Unit Title: Space Systems	Course/Subject: Integrated Science- CP Grade Level: 9th # of Weeks: 5

Identify Desired Results

Common Core Standards

- HS-ESS1-1: Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.
- HS-ESS1-2: Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.
- HS-ESS1-3: Communicate scientific ideas about the way stars, over their life cycle, produce elements.
- HS-ESS-1-4: Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
- RST.9-10.7- Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
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Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• The universe began with a period of extreme and rapid expansion known as the Big Bang, which occurred about 13.7 billion years ago. • Nuclear fusion within stars produces all atomic nuclei lighter than and including iron and the process releases the energy seen as starlight. • Elements heavier than iron are produced when certain massive stars achieve a super-nova stage and explode. • Stars, including the sun, go through a sequence of developmental	• What is the universe and how do scientists know how old it is? • What are the predictable patterns caused by Earth's movement in the solar system? • What are stars and what happens as they go through their life cycle?

stages. • The study of stars' light spectra and brightness is used to identify compositional elements of stars, their movements, and their distances from Earth. • Planetary motions around the sun can be predicted using Kepler's three empirical laws, which can be explained by Newton's Theory of Gravity.	

Expected Performances

What students should know and be able to do

Students will know the following:

- Electromagnetic radiation travels through space and carries energy and information with it.
- Electromagnetic radiation is divided into a spectrum based on the energy of the wave, but all EM waves travel at the speed of light through space.
- Light spectra from distant objects can provide information about composition, temperature, and line of sight velocity (Doppler Effect).
- The Big Bang occurred 13.7 billion years ago based on evidence from light from distant galaxies, abundance of elements in the universe and cosmic microwave background radiation.
- Nuclear fusion is the process which occurs in stars that is responsible for generating energy and creating elements heavier than hydrogen within their cores.
- Stars go through evolutionary and/or developmental stages which vary based on their initial masses.
- Orbits of various objects can be modeled using Kepler's three laws of planetary motion which can be explained by Newton's theory of gravity.

Students will be able to do the following:

- Identify the seven classifications of the electromagnetic spectrum.
- Compare and contrast the properties of various Electromagnetic waves.
- Explain how light spectra provide information about distant objects.
- Illustrate how the Doppler Effect can change the appearance of light from moving objects.
- Use evidence to explain how we know the universe is 13.7 billion years old.
- Describe the process of nuclear fusion and explain how elements heavier than hydrogen are created in the cores of stars.
- Create a timeline which describes the developmental stages of stars of different masses.
- Use Kepler's laws of planetary motion to calculate orbital properties of various objects in the solar system.

- Describe how gravity keeps objects in orbit and that the masses and distance between two objects determine the magnitude of the force of gravity between them.

Character Attributes

- Perseverance
- Cooperation
- Integrity
- Respect

Technology Competencies

- Computer simulations and models
- Research
- Collaboration

Develop Teaching and Learning Plan

Teaching Strategies:	Learning Activities:
• Provide note taking templates • Cooperative group work • Non-linguistic representation of important concepts • Use phenomenon and in class demos to introduce/reinforce concepts • Modeling graph interpretation • Interactive lecture/Class discussion • Think, Pair, Share • Gradual Release Model (I do, we do, you do)	• Diagram/Model a star producing Electromagnetic waves/Nuclear Fusion • Interpreting Electromagnetic Wave chart/graph • Activity: Doppler Effect (phenomenon) • Activity: Light Spectral Analysis • Graph Interpretation: H-R Diagram and classification of stars • Time line: Life cycles of stars of different masses • Lab: Kepler's Laws of Planetary Motion (3^{rd} law) • PhET: My Solar System

Assessments

Performance Task(s) Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: Create a children's book for 5^{th} grade students showing the lives of stars **Role**: Children's book author **Audience**: 5^{th} grade students **Situation**: You are a successful children's	• Quizzes and test • Formative assessments • Lab analysis and reflection on results • Warm-ups and exit tickets • Article readings/summaries • Homework assignments

book author who has been asked to create a book for children explaining the lives of stars **Product or Performance**: Children's Book **Standards for Success**: Rubric	

Suggested Resources

Hirshfeld, Alan W. *Astronomy: Activity and Laboratory Manual.* Sudbury, Mass: Jones & Bartlett Pub, 2008. Print.

Physical Science with Earth Science. New York, NY: Glencoe/McGraw-Hill, 2006. Print.

https://phet.colorado.edu/en/simulation/legacy/my-solar-system

New Milford Public Schools

Committee Member(s): Ethan Saldana and Danielle Ragonnet Unit Title: History of Earth	Course/Subject: Integrated Science- CP Grade Level: 9th # of Weeks: 5

Identify Desired Results

Common Core Standards

- HS-ESS1-5: Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.
- HS-ESS1-6: Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.
- RST.9-10.1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- RST.9-10.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
- RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• Radioactive decay lifetimes and isotopic content in rocks provide a way of dating rock formations and thereby fixing the scale of geological time. • Although active geological processes such as plate tectonics and erosion, have destroyed or altered most of the very early rock record on Earth, other objects in the solar system have changed little over billions of years and studying these objects can provide information about Earth's formation 4.6 billion years ago and its early history.	• How do people reconstruct and date events in Earth's planetary history?

Expected Performances What students should know and be able to do

Students will know the following:

- Large atomic nuclei spontaneously decay into lighter elements at a predictable rate (half-life) releasing energy in the process (Nuclear Fission).
- Isotopic content in rocks can be used to date geologic events.
- Most of Earth's early geologic history is lost due to processes such as plate tectonics and erosion.
- Other objects in solar system have changed little since their formation and provide information about Earth's formation and early history.
- Based on evidence from meteorites and cratered surfaces on the moon and other solar system objects, we know the Earth is 4.6 billion years old.

Students will be able to do the following:

- Explain the relationship between the abundance of parent/daughter isotopes in a sample and the amount of time that has passed since its formation.
- Create a model that describe the process of radioactive decay and explains how that can be used to identify the age of various objects.
- Explain the processes responsible for the destruction of evidence about Earth's early formation and history.
- Create a timeline using evidence from other solar system objects to describe the formation of the solar system.

Character Attributes

- Perseverance
- Cooperation
- Integrity
- Respect

Technology Competencies

- Computer simulations and models
- Research
- Collaboration

Develop Teaching and Learning Plan

Teaching Strategies:	Learning Activities:
• Provide note taking templates • Cooperative group work • Non-linguistic representation of important concepts • Use phenomenon and in class demos to introduce/reinforce concepts	• Activity: Penny Lab • Reading on nuclear fission • Time Line: Solar System Age and Formation • Model the changes in Earth through time.

• Modeling graph interpretation • Interactive lecture/Class discussion • Think, Pair, Share • Gradual Release Model (I do, we do, you do)	• Data/Graph analysis on: Half-life

Assessments	
Performance Task(s) Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: Calculate the age of the Earth using data collected by NASA and make a claim as to what age Earth truly is. **Role**: Planetary Scientist **Audience**: NASA **Situation**: You are an expert in the field of planetary science and you have been asked by NASA to use data they have collected to calculate Earth's age **Product or Performance**: Portfolio containing data analysis and your best estimate of the age of the Earth **Standards for Success**: Rubric	• Quizzes and test • Formative assessments • Lab analysis and reflection on results • Warm-ups and exit tickets • Article Readings/Summaries • Homework
Suggested Resources	
Physical Science with Earth Science. New York, NY: Glencoe/McGraw-Hill, 2006. Print.	

New Milford Public Schools

Committee Member(s): Ethan Saldana and Danielle Ragonnet Unit Title: Earth Systems	Course/Subject: Integrated Science- CP Grade Level: 9th # of Weeks: 9

Identify Desired Results

Common Core Standards

- HS-ESS2-1: Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
- HS-ESS2-3: Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.
- HS-ESS2-5: Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
- RST.9-10.1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- RST.9-10.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
- RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• Evidence from deep probes and seismic waves, reconstructions of historical changes in Earth's surface and magnetic field, and an understanding of physical and chemical processes lead to a model of Earth with a hot but solid inner core, liquid outer core, solid mantle and crust. • Radioactive decay of unstable isotopes continually generate new energy within Earth's crust and mantle providing the primary source of the heat that drives mantle convection (plate tectonics can be viewed as the surface expression of	• How and why is Earth constantly changing? • Why do the continents move, and what causes earthquakes and volcanoes? • How do Earth's major systems interact? • How do the properties and movement of water shape Earth's surface and affect its systems?

mantle convection). • The abundance of liquid water on Earth's surface and its unique combination of physical and chemical properties are central to the planet's dynamics (shaping the landscape).	

Expected Performances What students should know and be able to do

Students will know the following:

- Over geologic time, landmasses have changed their position as described by Alfred Wegener's Continental Drift theory.
- Evidence from sonar revealed undersea mountain chains which gave scientific data and reopened the Continental Drift theory.
- Analysis of sea floor rocks reveals evidence of magnetic reversals along with sea floor thickness and ages of the rock which supports the idea that continents are moving.
- The mechanism that moves the tectonic plates is driven by mantle convection and subduction (slab-pull and recycling of earth material).
- Radioactive decay is the energy source for the core and drives convection.
- The three types of boundaries: convergent, divergent and transform.
- Features and hazards associated with each boundary type.
- The global earthquake distribution and correspondence to plate tectonic boundaries.
- Earthquakes are caused by release of stress built up along fault lines as tectonic plates interact/move.
- Earthquakes propagate out from a central point in the form of seismic waves.
- The different types of seismic waves (S, P and Surface)
- Seismic waves have been used to model the Earth's internal structure.
- The Earth is made of four different layers.
- The different process of weathering.
- The effect of precipitation (normal vs acidic) on different types of materials.
- Underground formations caused by water (Karst Topography).
- The different agents of erosion.
- Surface water erosional and depositional features.
- Stream and glacial deposits relating to the energy of the agent and size of particle transport.

Students will be able to do the following:

- Develop and revise a model on Continental Drift
- Construct an explanation of plate tectonics.
- Use a model to demonstrate the features and hazards associated with plate boundaries.
- Analyze earthquake and volcanic data.

• Plan and conduct an experiment to investigate the effects of acid rain on different material. • Describe the different types of weathering. • Illustrate different erosional and depositional features.
Character Attributes
• Perseverance • Cooperation • Integrity • Respect
Technology Competencies
• Computer simulations and models • Research • Collaboration

Develop Teaching and Learning Plan

Teaching Strategies:	Learning Activities:
• Provide note taking templates • Cooperative group work • Non-linguistic representation of important concepts • Use phenomenon and in class demos to introduce/reinforce concepts • Modeling graph interpretation • Interactive lecture/Class discussion • Think, Pair, Share • Gradual Release Model (I do, we do, you do)	• Modeling and Revising Activity: Continental Drift + Incorporate new Information (Revise with Plate Tectonics) • Mapping locations of Earthquakes (recent) and Volcanoes with plate boundaries present on map (phenomena) • Make a Model with mechanism of Plate Tectonics. • Modeling of P, S and surface waves (slinky) (Phenomena) • Phet Simulation: Plate Tectonics • Lab: Acid Rain • Diagram of erosional and depositional features.

Assessments

Performance Task(s) Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: Plan and carry out an investigation on the effect of acid precipitation on	• Quizzes and test • Formative assessments • Lab analysis and reflection on results

different materials in order to make a recommendation to the town of New Milford **Role**: Geologist **Audience**: New Milford town planning committee **Situation**: You have been asked to study the effect of acid rain on different materials and make a recommendation about which material would be best to build a statue out of **Product or Performance**: Lab report with data collection, analysis and recommendation **Standards for Success**: Rubric	• Warm-ups and exit tickets • Article Reading/Summaries • Homework
Suggested Resources	
Physical Science with Earth Science. New York, NY: Glencoe/McGraw-Hill, 2006. Print. https://phet.colorado.edu/en/simulation/legacy/plate-tectonics	

New Milford Public Schools

Committee Member(s): Ethan Saldana and Danielle Ragonnet Unit Title: Weather and Climate	Course/Subject: Integrated Science- CP Grade Level: 9th # of Weeks: 9

Identify Desired Results

Common Core Standards

- HS-ESS2-4: Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
- HS-ESS2-2: Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.
- HS-ESS2-6: Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere and biosphere.
- HS-ESS2-7: Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.
- HS-ESS3-5: Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
- RST.9-10.1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- RST.9-10.2: Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
- RST.9-10.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
- RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• The foundation for Earth's global climate system is the electromagnetic radiation from the sun as well as its reflections, absorption, storage, and redistribution among the atmosphere, ocean, and land systems and this energy's re-radiation into space.	• What regulates weather and climate? • How do Earth's major systems interact? • How do people model and predict the effects of natural and human activities on Earth's climate? • How do living organisms alter Earth's processes and structures?

• The geological record shows that changes to global and regional climate can be caused by interactions among changes in the sun's energy output or Earth's orbit, tectonic events, ocean circulation, volcanic activity, glaciers, vegetation and human activities and that the changes can occur on a variety of time scales. • Climate change can occur when certain parts of Earth's systems are altered as evidenced by the geological record. • Changes in the atmosphere due to human activity have increased greenhouse gas concentrations and thus affect climate. • Global climate models incorporate scientists' best knowledge of physical and chemical processes and of the interactions of relevant systems and current models predict that although future regional climate changes will be complex and varied, average global temperatures will continue to rise. • Gradual changes the shape of Earth's orbit around the sun, together with the tilt of the planet's axis (rotation) and spherical shape have altered the intensity and distribution of sunlight falling on Earth. • The many dynamic and delicate feedbacks between the biosphere and other Earth systems cause a continual coevolution of Earth's surface and the life that exists on it.	
Expected Performances What students should know and be able to do	
Students will know the following: • The composition of the atmosphere (major and trace gases). • Air pressure • Energy from the sun is converted to thermal energy when the surface of the earth absorbs it.	

- The greenhouse effect.
- Albedo (feedback mechanisms)
- Specific heat (water vs. land/feedback mechanism)
- Carbon cycle (ocean acidification feedback mechanism)
- Humidity
- Cloud formation/Water cycle
- Angle of insolation/latitude
- Global winds and Pressure systems
- Influence of large bodies of water
- Topographic features (mountains)
- Milankovitch cycles and solar cycles
- Climate has a natural changing process
- Past climates have been reconstructed using a variety of proxies (ice cores, tree rings, coral reefs, fossil evidence, isotopes of atmospheric gases)
- Recent measurements of greenhouse gas concentration have shown an increase.
- Current global climate models have shown that Earth's global average temperature has been and continues to increase.
- Consequences and impacts due to climate change.
- Methods scientists use to create global climate models.

Students will be able to do the following:

- Develop a model showing energy transformations from the sun to the heating of the atmosphere.
- Conduct an investigation demonstrating the different specific heat of water and land.
- Construct an explanation about how albedo can impact atmospheric temperature and create a feedback.
- Conduct an investigation demonstrating the relationship between angle of insolation, latitude and temperature.
- Develop a model showing the forms and processes of carbon as it cycles through the different earth systems.
- Analyze and interpret data showing the relationship between temperature and relative humidity.
- Construct an explanation of how solar energy causes water to cycle. (adiabatic cooling)
- Ask questions about how Earth's orbital properties can influence temperature and climate.
- Use a model to construct an explanation why the world is divided into bands of varying wind and pressure systems.
- Evaluate historical climate data to describe how Earth's climate has changed.
- Analyze and interpret current climate models to show how Earth's global temperature has been increasing.
- Ask questions about what factors should be included in a climate model and how climate models are created and used.

- Discuss the impact of climate change on future populations.

Character Attributes

- Perseverance
- Cooperation
- Integrity
- Respect

Technology Competencies

- Computer simulations and models
- Research
- Collaboration

Develop Teaching and Learning Plan

Teaching Strategies:	Learning Activities:
• Provide note taking templates • Cooperative group work • Non-linguistic representation of important concepts • Use phenomenon and in class demos to introduce/reinforce concepts • Modeling graph interpretation • Interactive lecture/Class discussion • Think, Pair, Share • Gradual Release Model (I do, we do, you do)	• Model solar energy transformation into atmospheric heat for Earth • Lab: Specific Heat • Lab: Angle of Insolation • Lab: Albedo • Model the process of cloud formation • Graph interpretation: Relative humidity vs. temperature • Model the Water cycle • Model the Carbon cycle • Time Line: Historical climate data • Climate Data Analysis Activity • pHet simulation: Greenhouse Effect

Assessments

Performance Task(s) Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: To evaluate the climate at several sites on a new world and make a recommendation for a colony **Role:** Climate Scientist **Audience**: Department of Human Colonization **Situation**: You have been asked to	• Quizzes and test • Formative assessments • Lab analysis and reflection on results • Warm-ups and exit tickets • Article Readings/Summaries • Homework

evaluate several sites and recommend the best location for a colony **Product or Performance**: Analysis of different locations' climates and your recommendation **Standards for Success**: Rubric	

Suggested Resources
Physical Science with Earth Science. New York, NY: Glencoe/McGraw-Hill, 2006. Print. https://phet.colorado.edu/en/simulation/legacy/greenhouse

New Milford Public Schools

Committee Member(s): Ethan Saldana and Danielle Ragonnet Unit Title: Human Impact and Sustainability	Course/Subject: Integrated Science- CP Grade Level: 9th # of Weeks: 8

Identify Desired Results

Common Core Standards

- HS-ESS3-1: Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards , and changes in climate have influenced human activity.
- HS-ESS3-2: Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
- HS-ESS3-3: Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
- HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
- HS-ESS3-6: Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
- RST.9-10.1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- RST.9-10.2: Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
- RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
- RST.9-10.5: Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• Resource availability has guided the development of human society. • All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. • Natural hazards and other geological events have shaped the course of human history and have	• How do humans depend on Earth's resources? • How do Earth's major systems interact? • How do natural hazards affect individuals and societies? • How do humans change the planet? • What steps can be taken to manage the planet's resources for future generations?

sometimes significantly altered the sizes of human populations and have driven human migrations. • The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. • When the source of an environmental problem is understood, new technologies and regulations can be utilized to regulate human activities in order to mitigate global impacts.	

Expected Performances
What students should know and be able to do

Students will know the following:

- Resources are not evenly distributed around the world and have guided the development of human societies.
- Some resources are renewable and some are non-renewable.
- Resources extracted from the earth have risks, benefits and costs associated with their extraction, processing and distribution.
- How usable electricity is created from a variety of natural resources.
- Natural hazards exist in a variety of forms and locations and have affected human societies.
- Examples of natural disasters which have affected human populations and in some cases caused migration.
- Examples of predictions and future impact of natural disasters on human population and society.
- Pollution sources and impacts (air, water and others).
- Technological and legislative improvement to mitigate pollution (Clean Air Act, Clean Water Act, Endangered Species Act, etc)
- The impact of land use on natural resources such as: deforestation, urbanization and loss of wetlands.
- Best Management Practices (BMP) that prevent ecosystem degradation.

Students will be able to do the following:

- Identify different resources, their distribution and location.
- Analyze the cost, benefit and risk with the extraction, processing and distribution of natural resources.
- Explain how natural resource distribution has guided the development of human civilization.
- Compare the impact of natural hazards on human populations.
- Describe the cause and effect of different pollution sources and their impact on the environment.
- Evaluate technological improvements and best management practices which

have or may improve ecosystems.
- Discuss legislative acts which aimed to improve the quality and protect the environment.

Character Attributes
• Perseverance • Cooperation • Integrity • Respect • Citizenship

Technology Competencies
• Computer simulations and models • Research • Collaboration

Develop Teaching and Learning Plan

Teaching Strategies:	Learning Activities:
• Provide note taking templates • Cooperative group work • Non-linguistic representation of important concepts • Use phenomenon and in class demos to introduce/reinforce concepts • Modeling graph interpretation • Interactive lecture/Class discussion • Think, Pair, Share • Gradual Release Model (I do, we do, you do)	• Mapping of resource location • Research: Mineral • Venn Diagram: Renewable vs Non-Renewable resources • Model: Electricity generation from various energy resources • Activity: Cooking Mining • Case study: The effect of natural resource depletion and natural hazards on human populations. • Article: Soil degradation • Article: Water as a resource • pHet Simulation: Nuclear Fission • Activity: Evaluate Best Management Practices and Legislation to improve environment.

Assessments

Performance Task(s) Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: Create a model of a town which is designed to minimize environmental impacts. **Role**: Civil Engineer	• Quizzes and test • Formative assessments • Lab analysis and reflection on results • Warm-ups and exit tickets

Audience: Town Planning Board **Situation**: You have been asked to develop a strategic plan for a new town which is designed to minimize environmental impacts. **Product or Performance**: A poster that presents the town model which includes analysis of risks and benefits and justifications for placement of certain structures (landfill, water treatment, etc) **Standards for Success**: Rubric	• Article readings/summaries

Suggested Resources

Physical Science with Earth Science. New York, NY: Glencoe/McGraw-Hill, 2006. Print.

https://phet.colorado.edu/en/simulation/legacy/nuclear-fission