EGG HARBOR TOWNSHIP PUBLIC SCHOOLS
CURRICULUM

Middle School Science
Grades 6-8

Length of Course:	Full Year
Elective / Required:	Refer to Program of Studies
Schools:	Alder and Fernwood Middle Sch.
Student Eligibility:	Grades 6, 7 and 8
Credit Value:	5 credits
Date Submitted:	September 2016
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DISTRICT MISSION STATEMENT

Our mission in the Egg Harbor Township School District is to partner with the student, family, school, and community to provide a safe learning environment that addresses rigorous and relevant 21st Century standards and best practices which will develop academic scholarship, integrity, leadership, citizenship, and the unique learning style of students, while encouraging them to develop a strong work ethic and to act responsibly in their school community and every day society.

SCIENCE – PHILOSOPHY

We believe that ALL students regardless of race, ethnicity, socio-economic status, religious background, and/or any other classification are deserving of a holistic science education. This holistic approach would include an education that will allow them to fully discover themselves, their strengths and weaknesses, and benefit from science instruction.

> Scientific literacy assumes an increasingly important role in the context of globalization. The rapid pace of technological advances, access to an unprecedented wealth of information, and the pervasive impact of science and technology on day-to-day living require a depth of understanding that can be enhanced through quality science education. In the 21st century, science education focuses on the practices of science that lead to a greater understanding of the growing body of scientific knowledge that is required of citizens in an ever-changing world (NJCCCS-Science).

Science curricula are designed to reinforce 21st Century Learning, to maximize rigor, relevance, and relationships, and to engage students individually through differentiated instruction.

SCIENCE - STATEMENT OF PURPOSE

Education exists for the purpose of enabling each individual to realize and maintain her/his full potential. Scientifically literate students possess the knowledge and understanding of scientific concepts and processes required for personal decision-making, participation in civic and cultural affairs, and economic productivity.

> Science, engineering, and technology influence and permeate every aspect of modern life. Some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions, such as selecting among alternative medical treatments or determining how to invest public funds for water supply options. In addition, understanding science and the extraordinary insights it has produced can be meaningful and relevant on a personal level, opening new worlds to explore and offering lifelong opportunities for enriching people's lives. In these contexts, learning science is

important for everyone, even those who eventually choose careers in fields other than science or engineering (NJSLS-Science)

All students engage in science experiences that promote the ability to ask, find, or determine answers to questions derived from natural curiosity about everyday things and occurrences. The underpinning of the revised standards lies in the premise that science is experienced as an active process in which inquiry is central to learning and in which students engage in observation, inference, and experimentation on an ongoing basis, rather than as an isolated a process. When engaging in inquiry, students describe objects and events, ask questions, construct explanations, test those explanations against current scientific knowledge, and communicate their ideas to others in their community and around the world. They actively develop their understanding of science by identifying their assumptions, using critical and logical thinking, and considering alternative explanations (NJCCCS-Science).

Our school district provides an extensive science program, which will enable students to succeed and compete in the global marketplace using the New Jersey Student Learning Standards as well as the Next Generation Science Standards.

INTRODUCTION

The most precious resource teachers have is time. Regardless of how much time a course is scheduled for, it is never enough to accomplish all that one would like. Therefore, it is imperative that teachers utilize the time they have wisely in order to maximize the potential for all students to achieve the desired learning.

High quality educational programs are characterized by clearly stated goals for student learning, teachers who are well-informed and skilled in enabling students to reach those goals, program designs that allow for continuous growth over the span of years of instruction, and ways of measuring whether students are achieving program goals.

THE EGG HARBOR TOWNSHIP SCHOOL DISTRICT CURRICULUM TEMPLATE

The Egg Harbor Township School District has embraced the backward-design model as the foundation for all curriculum development for the educational program. When reviewing curriculum documents and the Egg Harbor Township curriculum template, aspects of the backward-design model will be found in the stated enduring *understandings/essential questions, unit assessments,* and *instructional activities*. Familiarization with backward-design is critical to working effectively with Egg Harbor Township's curriculum guides.

GUIDING PRINCIPLES: WHAT IS BACKWARD DESIGN? WHAT IS UNDERSTANDING BY DESIGN?

"Backward design" is an increasingly common approach to planning curriculum and instruction. As its name implies, "backward design" is based on defining clear goals, providing acceptable evidence of having achieved those goals, and then working 'backward' to identify what actions need to be taken that will ensure that the gap between the current status and the desired status is closed.

Building on the concept of backward design, Grant Wiggins and Jay McTighe (2005) have developed a structured approach to planning programs, curriculum, and instructional units. Their model asks educators to state goals; identify deep understandings, pose essential questions, and specify clear evidence that goals, understandings, and core learning have been achieved.

Programs based on backward design use desired results to drive decisions. With this design, there are questions to consider, such as: What should students understand, know, and be able to do? What does it look like to meet those goals? What kind of program will result in the outcomes stated? How will we know students have achieved that result? What other kinds of evidence will tell us that we have a quality program? These questions apply regardless of whether they are goals in program planning or classroom instruction.

The backward design process involves three interrelated stages for developing an entire curriculum or a single unit of instruction. The relationship from planning to curriculum design, development, and implementation hinges upon the integration of the following three stages.

Stage I: Identifying Desired Results: Enduring understandings, essential questions, knowledge and skills need to be woven into curriculum publications, documents, standards, and scope and sequence materials. Enduring understandings identify the "big ideas" that students will grapple with during the course of the unit. Essential questions provide a unifying focus for the unit and students should be able to answer more deeply and fully these questions as they proceed through the unit. Knowledge and skills are the *"stuff"* upon which the understandings are built.

Stage II: Determining Acceptable Evidence: Varied types of evidence are specified to ensure that students demonstrate attainment of desired results. While discrete knowledge assessments (e.g.: multiple choice, fill-in-the-blank, short answer, etc…) will be utilized during an instructional unit, the overall unit assessment is performance-based and asks students to demonstrate that they have mastered the desired understandings. These culminating (summative) assessments are authentic tasks that students would likely encounter in the real-world after they leave school. They allow students to demonstrate all that they have learned and can do. To demonstrate their understandings students can explain, interpret, apply, provide critical and insightful points of view, show empathy and/or evidence self-knowledge. Models of student performance and clearly

defined criteria (i.e.: rubrics) are provided to all students in advance of starting work on the unit task.

Stage III: Designing Learning Activities: Instructional tasks, activities, and experiences are aligned with stages one and two so that the desired results are obtained based on the identified evidence or assessment tasks. Instructional activities and strategies are considered only once stages one and two have been clearly explicated. Therefore, congruence among all three stages can be ensured and teachers can make wise instructional choices.

At the curricular level, these three stages are best realized as a fusion of research, best practices, shared and sustained inquiry, consensus building, and initiative that involves all stakeholders. In this design, administrators are instructional leaders who enable the alignment between the curriculum and other key initiatives in their district or schools. These leaders demonstrate a clear purpose and direction for the curriculum within their school or district by providing support for implementation, opportunities for revision through sustained and consistent professional development, initiating action research activities, and collecting and evaluating materials to ensure alignment with the desired results. Intrinsic to the success of curriculum is to show how it aligns with the overarching goals of the district, how the document relates to district, state, or national standards, what a high quality educational program looks like, and what excellent teaching and learning looks like. Within education, success of the educational program is realized through this blend of commitment and organizational direction.

INTENT OF THE GUIDE

This guide is intended to provide teachers with course objectives and possible activities, as well as assist the teacher in planning and delivering instruction in accordance with the New Jersey Core Curriculum Content Standards. The guide is not intended to restrict or limit the teacher's resources or individual instruction techniques. It is expected that the teacher will reflectively adjust and modify instruction and units during the course of normal lessons depending on the varying needs of the class, provided such modified instruction attends to the objectives and essential questions outlined below.

Unit Name: Unit 1 - Earth's Structure **Time Frame: 5 weeks**
Author: 6th Grade Science – Egg Harbor Township School District

UNIT

Subject: **Science** Country: **USA**
Course/Grade: 6 State/Group: **NJ**
School: **Fernwood Avenue Middle School & Alder Avenue Middle School**

UNIT SUMMARY

Earth is a unified system that can be modeled by dividing it into four interacting subsystems: the biosphere, the atmosphere, the hydrosphere, and the geosphere.

The Rock Cycle is a slowly repeating process by which Earth's rocks are built, destroyed, and changed by force in and on Earth.

Interaction of tectonic plates at plate boundaries forms earthquakes, volcanoes, and mountains.

Erosion and deposition by water, wind, ice and gravity can change the landforms made by plate motion.

UNIT RESOURCES

NGSS
Pearson text: Earth's Structure and Additional Resources
Laboratory Materials and Models

Internet Resource Links:

Pearson on-line textbook (successnet.com)
Brain-Pop (brainpop.com)
Web-Quests (teacher generated resources)
United Streaming (discoveryeducation.com)

STAGE ONE

GOALS AND STANDARDS

MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. [Clarification Statement: Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth's materials.] [Assessment Boundary: Assessment does not include the identification and naming of minerals.]

MS-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. [Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical.] [Assessment Boundary: A quantitative understanding of the latent heats of vaporization and fusion is not assessed.]

MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. [Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).]

ENDURING UNDERSTANDINGS

- Earth is a unified system that can be modeled by dividing it into four interacting subsystems: the biosphere, the atmosphere, the hydrosphere, and the geosphere.
- Interaction of tectonic plates at plate boundaries forms earthquakes, volcanoes, and mountains.
- Erosion and deposition by water, wind, ice and gravity can change the landforms made by plate motion.
- The Rock Cycle is a slowly repeating process by which Earth's rocks are built, destroyed, and changed by force in and on Earth.

ESSENTIAL QUESTIONS

What is the structure of Earth?
How do rocks form?
How do moving plates change Earth's crust?
Why do earthquakes occur more often in some place than in others?
How does a volcano erupt?

KNOWLEDGE AND SKILLS

Students will know…

- The Earth System
- Earth's Interior
- The Rock Cycle
- Classifying Rocks
- Plate Tectonics
- Earthquakes
- Volcanoes

Students will be able to…

- identify and describe the main components of the Earth system.
- summarize the effects of constructive and destructive forces.
  explain how geologists learn about Earth's inner structures.
- identify the characteristics of Earth's crust, mantle, and core, and describe how temperature and pressure change inside Earth.
- define a mineral.
- explain how minerals are identified.
- explain how minerals form and where mineral resources are located.
- list the characteristics used to identify rocks, and identify the three major groups of rocks.
- describe the rock cycle.
- explain Alfred Wegener's hypothesis about the continents, evidence supporting the hypothesis, and why the hypothesis was rejected.
- explain the theory of plate tectonics.
- explain how stress in the crust changes Earth's surface.
- describe the three major types of faults.

- compare and contrast the land features that result from plate movement.
- identify where volcanic regions and hot spot volcanoes are found on Earth's surface and why they are found there.

STAGE TWO

PERFORMANCE TASKS
Foldables, Web-Quests, Plickers, Kahoot, Socrative, Interactive Notebooks, and Labs
OTHER EVIDENCE
Quizzes, Tests, Lab Write-ups, and Performance Based Assessments

STAGE THREE

LEARNING PLAN

- Chapter 1: Introducing Earth
  - Lesson 1: The Earth System
  - Lesson 2: Earth's Interior
- Chapter 2: Minerals and Rocks
  - Lesson 1: Properties of Minerals
  - Lesson 2: Classifying Rocks
  - Lesson 6: The Rock Cycle
- Chapter 3: Plate Tectonics
  - Lesson 1: Drifting Continents
  - Lesson 3: The Theory of Plate Tectonics
- Chapter 4: Earthquakes
  - Lesson 1: Forces in Earth's Crust
- Chapter 5: Volcanoes
  - Lesson 1: Volcanoes and Plate Tectonics

Suggested Activities:

- Read, discuss, and complete lesson activities
- Review and Reinforce and/or Enrich when appropriate
- Small group discussions
- Graphic organizers
- Identify Main-Ideas of the Lesson
- Manipulatives
- Web-Quests
- Labs
- Videos

Unit Name: Unit 2 - Cells **Time Frame: 5 weeks**
Author: 6th Grade Science – Egg Harbor Township School District

UNIT

Subject: **Science** Country: **USA**
Course/Grade: 6 State/Group: **NJ**
School: **Fernwood Avenue Middle School and Alder Avenue Middle School**

UNIT SUMMARY

The cell is the basic unit of all living things.

A cell is made up of structures that provide support and movement, process energy, and transport material into, within, and out of a cell.

An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular).

Through cell division, one cell can produce new cells to grow and develop into a multicellular organism.

UNIT RESOURCES

NGSS
Pearson text: Cells and Heredity and Additional Resources
Laboratory Materials and Models

Internet Resource Links:

Pearson on-line textbook (successnet.com)
Brain-Pop (brainpop.com)
Web-Quests (teacher generated resources)
United Streaming (discoveryeducation.com)

STAGE ONE

GOALS AND STANDARDS

MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. [Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells.]

MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. [Clarification Statement: Emphasis is on the cell functioning as a whole system and the primary role of identified parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.] [Assessment Boundary: Assessment of organelle structure/function relationships is limited to the cell wall and cell membrane. Assessment of the function of the other organelles is limited to their relationship to the whole cell. Assessment does not include the biochemical function of cells or cell parts.]

MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. [Clarification Statement: Emphasis is on the conceptual understanding that cells form tissues and tissues form organs specialized for particular body functions. Examples could include the interaction of subsystems within a system and the normal functioning of those systems.] [Assessment Boundary: Assessment does not include the mechanism of one body system independent of others. Assessment is limited to the circulatory, excretory, digestive, respiratory, muscular, and nervous systems.]

ENDURING UNDERSTANDINGS

- The cell is the basic unit of all living things.
- A cell is made up of structures that provide support and movement, process energy, and transport material into, within, and out of a cell.
- An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular).
- Through cell division, one cell can produce new cells to grow and develop into a multicellular organism.

ESSENTIAL QUESTIONS

What are cells made of?

How do living things get energy?

KNOWLEDGE AND SKILLS

Students will know…

- Discovering Cells
- Looking Inside Cells
- The Cell in its Environment
- Photosynthesis
- Cellular Respiration
- Cell Division

Students will be able to…

- Tell what cells are
- Describe how scientists first observed and developed the cells theory
- Describe how microscopes produce magnified images
- Describe the functions of cell structures and organelles
- Describe how cells are organized in many-celled organisms
- Describe how materials move into and out of cells
- Explain how living things get energy from the sun
- Describe what happens during photosynthesis
- Describe the events that occur during respiration
- Tell what happens during fermentation
- Summarize the functions of cell division
- Identify the events that take place during the three stages of the cell cycle

STAGE TWO

PERFORMANCE TASKS
Foldables, Web-Quests, Plickers, Kahoot, Socrative, Interactive Notebooks, and Labs

OTHER EVIDENCE
Quizzes, Tests, Lab Write-ups, and Performance Based Assessments

STAGE THREE

LEARNING PLAN

- Chapter 1: Introduction to Cells
  - Lesson 1: Discovering Cells
  - Lesson 2: Looking Inside Cells
  - Lesson 4: The Cell in its Environment
- Chapter 2: Cell Processes and Energy
  - Lesson 1: Photosynthesis
  - Lesson 2: Cellular Respiration
  - Lesson 3: Cell Division

Suggested Activities:

- Read, discuss, and complete lesson activities
- Review and Reinforce and/or Enrich when appropriate
- Small group discussions
- Graphic organizers
- Identify Main-Ideas of the Lesson
- Manipulatives
- Web-Quests
- Labs
- Videos

Unit Name: Unit 3 - Heredity **Time Frame: 5 weeks**
Author: 6th Grade Science – Egg Harbor Township School District

UNIT

Subject: **Science** Country: **USA**
Course/Grade: 6 State/Group: **NJ**
School: **Fernwood Avenue Middle School and Alder Avenue Middle School**

UNIT SUMMARY

Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.

Every organism requires a set of instructions that specifies its traits**.** These instructions are stored in the organism's chromosomes**.**

In sexual reproduction, traits are passed from parent to offspring. These traits have patterns that can be predicted to some degree.

Traits have more than one gene that determine its phenotype.

Environmental factors play a role on influencing traits, these can be beneficial or harmful.

Through genetic engineering or selective breeding, people have the ability produce desired traits.

UNIT RESOURCES

NGSS
Pearson text: Cells and Heredity and Additional Resources
Laboratory Materials and Models

Internet Resource Links:

Pearson on-line textbook (successnet.com)
Brain-Pop (brainpop.com)
Web-Quests (teacher generated resources)
United Streaming (discoveryeducation.com)

STAGE ONE

GOALS AND STANDARDS

MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. [Clarification Statement: Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins.] [Assessment Boundary: Assessment does not include specific changes at the molecular level, mechanisms for protein synthesis, or specific types of mutations.]

MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. [Clarification Statement: Emphasis is on using models such as Punnett squares, diagrams, and simulations to describe the cause and effect relationship of gene transmission from parent(s) to offspring and resulting genetic variation.]

ENDURING UNDERSTANDINGS

- Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.

- Every organism requires a set of instructions that specifies its traits**.** These instructions are stored in the organism's chromosomes**.**

- In sexual reproduction, traits are passed from parent to offspring. These traits have patterns that can be predicted to some degree.

- Traits have more than one gene that determine its phenotype.

- Environmental factors play a role on influencing traits, these can be beneficial or harmful.

ESSENTIAL QUESTIONS

Why don't offspring always look like their parents?

What does DNA do?

How do life forms change over time?

KNOWLEDGE AND SKILLS

Students will know…

- What is heredity?
- Probability and Heredity
- The Genetic Code
- Mutations
- Darwin's Theory
- Evidence of Evolution
- Rate of Change

Students will be able to…

- Describe the results of Mendel's experiments
- Identify the role of alleles in controlling the inheritance of traits
- Define probability and describe how it helps explain the results of genetic crosses
- Explain what is meant by phenotype and genotype
- Explain what forms the genetic code
- Describe how DNA copies itself
- Identify how mutations can affect an organism
- Explain how cancer is related to mutations and the cell cycle
- Describe how Darwin's observations helped him to develop his hypothesis
- Explain how natural selection leads to evolution
- State evidence that supports the theory of evolution

- Explain how new species form
- Identify the two patterns that describe the rate of evolution

STAGE TWO

PERFORMANCE TASKS
Foldables, Web-Quests, Plickers, Kahoot, Socrative, Interactive Notebooks, and Labs

OTHER EVIDENCE
Quizzes, Tests, Lab Write-ups, and Performance Based Assessments

STAGE THREE

LEARNING PLAN

- Chapter 3: Genetics: The Science of Heredity
  - Lesson 1: What is Heredity?
  - Lesson 2: Probability and Heredity
- Chapter 4: DNA: The Code of Life
  - Lesson 1: The Genetic Code
  - Lesson 3: Mutations
- Chapter 6: Change Over Time
  - Lesson 1: Darwin's Theory
  - Lesson 2: Evidence of Evolution
  - Lesson 3: Rate of Change

Suggested Activities:

- Read, discuss, and complete lesson activities
- Review and Reinforce and/or Enrich when appropriate
- Small group discussions
- Graphic organizers
- Identify Main-Ideas of the Lesson
- Manipulatives
- Web-Quests
- Labs
- Videos

Unit Name: Unit 4 - Astronomy & Space Science Time Frame: 5 weeks
Author: 6th Grade Science – Egg Harbor Township School District

UNIT

Subject: **Science** Country: **USA**
Course/Grade: 6 State/Group: **NJ**
School: **Fernwood Avenue Middle School & Alder Avenue Middle School**

UNIT SUMMARY

This unit expands upon the learners understanding of Earth Science.

Students will study the solar system in this unit with a focus on the moon, earth and sun.
Solar system models explain and predict eclipses, lunar phases, and seasons.

UNIT RESOURCES

NGSS
Pearson text: Astronomy & Space Science and Additional Resources
Laboratory Materials and Models

Internet Resource Links:

Pearson on-line textbook (successnet.com)
Brain-Pop (brainpop.com)
Web-Quests (teacher generated resources)
United Streaming (discoveryeducation.com)

STAGE ONE

GOALS AND STANDARDS

MS-ESS1-1. Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. [Clarification Statement: Examples of models can be physical, graphical, or conceptual.]

MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. [Clarification Statement: Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as students' school or state).] [Assessment Boundary: Assessment does not include Kepler's Laws of orbital motion or the apparent retrograde motion of the planets as viewed from Earth.]

MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system. [Clarification Statement: Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of scale properties include the sizes of an object's layers (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data include statistical information, drawings and photographs, and models.] [Assessment Boundary: Assessment does not include recalling facts about properties of the planets and other solar system bodies.]

ENDURING UNDERSTANDINGS

This unit expands upon the learners understanding of Earth Science.

Students will study the solar system in this unit with a focus on the moon, earth and sun.
Solar system models explain and predict eclipses, lunar phases, and seasons.

ESSENTIAL QUESTIONS

How do Earth, the moon, and sun interact?
Why are objects in the solar system different from each other?

KNOWLEDGE AND SKILLS

Students will know…

- The Sky from Earth
- Earth and Space
- Gravity and Motion
- Phases and Eclipses
- Introducing the Solar System
- The Sun
- The Inner Planets
- The Outer Planets

Students will be able to…

- Identify objects and constellations visible without a telescope in the night sky.
- Describe the apparent motions of stars and planets throughout the year.
- Demonstrate how Earth moves in space.
- Explain what causes the cycle of seasons on Earth.
- Identify what determines the strength of the force of gravity between two objects.
- Describe two factors that keep the moon and Earth in orbit.
- Explain what causes the phases of the moon.
- Describe solar and lunar eclipses.
- Identify the objects that make up the solar system.
- Explain how the solar system formed.
- Identify the layers of the sun's interior and atmosphere.
- Describe the features that form on or able the sun's surface.
- Describe the characteristics that the inner planets have in common.
- Identify the main characteristics that distinguish each of the inner planets.
- Describe characteristics that the gas giants have in common.
- Identify characteristics that distinguish each outer planet.
- Explain how scientists classify small bodies in the solar system.

STAGE TWO

PERFORMANCE TASKS

Foldables, Web-Quests, Plickers, Kahoot, Socrative, Interactive Notebooks, and Labs

OTHER EVIDENCE

Quizzes, Tests, Lab Write-ups, and Performance Based Assessments

STAGE THREE

LEARNING PLAN

- Chapter 1: Earth, Moon, and Sun
  - Lesson 1: Sky from Earth

    - Lesson 2: Earth and Space
    - Lesson 3: Gravity and Motion
    - Lesson 4: Phases and Eclipses
- Chapter 3: The Solar System
    - Lesson 2: Introducing the Solar System
    - Lesson 3: The Sun
    - Lesson 4: The Inner Planets
    - Lesson 5: The Outer Planets
    - Lesson 6: Small Solar System Objects

Suggested Activities:

- Read, discuss, and complete lesson activities
- Review and Reinforce and/or Enrich when appropriate
- Small group discussions
- Graphic organizers
- Identify Main-Ideas of the Lesson
- Manipulatives
- Web-Quests
- Labs
- Videos

Unit Name: Weather & Climate **Time Frame: 12-13 weeks**
Author: Egg Harbor Township Science Curriculum Team

UNIT ONE

Subject: **Science** Country: **USA**
Course/Grade: **7th** State/Group: **NJ**
School: **Egg Harbor Township School District**

UNIT SUMMARY

The purpose of this unit is to study and understand the interactions of Earth's large-scale systems, the role of water in Earth's surface processes, and the flow of energy among these systems. Topics covered include the hydrologic cycle, currents, global winds, and air masses, and the impact of human activity and its effects on our planet. In this unit, students are expected to demonstrate proficiency in developing and using models and planning and carrying out investigations as they make sense of the disciplinary core ideas. Students will use these practices to demonstrate an understanding of these core ideas.

UNIT RESOURCES

Water and the Atmosphere, Pearson
Chapters: 1 – Fresh Water, 2 – The Oceans, 3 – The Atmoshpere, 4 – Weather, 5 – Climate & Climate Change

Internet Resource Links:
http://www.pearsonsuccessnet.com
http://www.discoveryeducation.com
http://www.brainpop.com
http://www.noaa.gov

STAGE ONE

GOALS AND STANDARDS

SCI.MS-ESS2-4 Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

SCI.MS-ESS2-5 Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
SCI.MS-ESS2-6 Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

SCI.MS-ESS3-5 Ask questions to clarify stability and change in global temperatures

ENDURING UNDERSTANDINGS

Earth's weather and climate systems are the result of complex interactions between land, ocean, ice, and atmosphere. Scientists use weather variables to describe weather and study weather systems. Climate is the long-term average weather conditions that occur in an area.

ESSENTIAL QUESTIONS

-How does fresh water cycle on Earth?
-What are some characteristics of Earth's oceans?
-How does the sun's energy affect Earth's atmosphere?
-What variables help predict future outcome of weather?

-What factors affect Earth's climate?

KNOWLEDGE AND SKILLS
Fresh Water
The Oceans
The Atmosphere
Weather
Climate and Climate Change
Essential Vocabulary
weather, temperature, air pressure, wind, humidity, dew point, fog, clouds,
water cycle, pressure systems, air masses, meteorologist, UV radiation, atmosphere, oceanic flow, latitude, longitude, global warming, condensation, precipitation, evaporation, runoff, greenhouse effect, Coriolis effect, current

Define weather and describe variables that occur including temperature, air pressure, wind, humidity, and dew point.
Explain how cloud types can be used to predict future weather conditions
Illustrate and explain how weather is related to the water cycle.
Compare and illustrate pressure systems and **explain** how air masses drive weather patterns.
Define and illustrate fronts.
Explain how and why severe weather occurs.
Describe ways meteorologist measure and predict weather.
Collect data using weather maps and **predict** future weather.
Explain the importance of the atmosphere.
Determine how air circulates and **explain** how patterns influence weather conditions.
Create a model of prevailing winds incorporating oceanic flow. Justify how latitude and longitude correlate with weather patterns.
Collect data about climate change in a specific area and **justify** the reasoning for global warming **citing** specific evidence.

STAGE TWO

PERFORMANCE TASKS
Hurricane Tracking, Layers of the Atmosphere project, Cloud/Weather observation journal, global warming debate, formation of cloud lab
OTHER EVIDENCE
Quizzes, Tests, Lab Writeups, Performance-based assessments

STAGE THREE

LEARNING PLAN
1 - Fresh Water
- **1 Water on Earth**

2 - The Oceans
- **3 Currents and Climate**

3 - The Atmosphere
- **1 The Air Around You**
- **3 Layers of the Atmosphere**
- **4 Energy in Earth's Atmosphere**
- **5 Heat Transfer**

Unit Name: Ecology and the Environment **Time Frame: 12-13 weeks**
Author: Egg Harbor Township Science Curriculum Team

UNIT TWO

Subject: **Science** Country: **USA**
Course/Grade: **7th** State/Group: **NJ**
School: **Egg Harbor Township School District**

UNIT SUMMARY
The purpose of this unit is to analyze, understand and interpret data and models, and also demonstrate a deeper understanding of the cycling of matter and energy in ecosystems. Students will be able to study interactions among organisms within an ecosystem. They will also need to consider how abiotic and biotic factors affect population growth within an ecosystem. They also understand that the limits of resources influence the growth of organisms and populations, which may result in competition for those limited resources. Students analyze and interpret data and design solutions to build on their understanding of the ways that human activities affect Earth's systems.

UNIT RESOURCES
Ecology and the Environment, Pearson
Chapters 1 – Populations and Communities, 2 – Ecosystems and Biomes, 4- Land, Air and Water Resources
Internet Resource Links:
http://www.pearsonsuccessnet.com
http://www.discoveryeducation.com
http://www.brainpop.com
http://www.noaa.gov

STAGE ONE

GOALS AND STANDARDS

SCI.MS-LS1 From Molecules to Organisms: Structures and Processes

SCI.MS-LS2 Ecosystems: Interactions, Energy, and Dynamics

SCI.MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

SCI.MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

SCI.MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

SCI.MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

SCI.MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

ENDURING UNDERSTANDINGS
Living things depend on both abiotic and biotic resources to ensure survival.
Living organisms interact and compete in various habitats.
Living organisms interact with each other in a variety of ways that can be either beneficial or harmful.
Changes in an ecosystem will impact a populations size and growth.

ESSENTIAL QUESTIONS

How do living things affect one another?
How do energy and matter move through ecosystems?
What can people do to use resources wisely?
What is an ecosystem?
What are biotic and abiotic factors?
How do various organisms obtain the energy the need to sustain life?
How is energy flow modeled in an ecosystem? ?
How does an energy pyramid show energy transfer in an ecosystem?
How is matter transferred in an ecosystem?
How do individuals and groups of organisms interact?
What is symbiosis?
How does biodiversity influence a size of a population and/or a community?
How does competition exist in an ecosystem?

KNOWLEDGE AND SKILLS
Popluations and Communties
Ecosystems and Biomes
Land, Air and Water Resources
Vocabulary:

Abiotic, Biotic, Population, Community, Producer, Consumer, Decomposer, Herbivore, Omnivore, Carnivore, Food chain, Food web, Energy pyramid, Limiting factors, Symbiosis, Mutualism, Parasitism, Commensalism, Competition

Create a model to show how food releases energy.
Differentiate between ecosystem, community and population.
Differentiate between consumer, producer and decomposer.
Identify the needs of living things and determine the method of obtaining these needs.
Model energy flow through a food chain.
Create a model of a food web and explain how energy moves through an ecosystem.
Model an energy pyramid and explain how energy is transferred.
Model and analyze a disruption in food web and explain its potential influence.
Explain how matter cycles influence energy flow in an ecosystem.
Identify ways an ecosystem can change.
Identify limiting factors in an ecosystem.
Explain how limiting factors relate to carrying capacity.
Compare and contrast a habitat and a niche.
Explain what factors influence a population size and density.
Compare and contrast types of symbiosis.
Identify ways that organisms compete for their needs.

STAGE TWO

PERFORMANCE TASKS
Food Chain Project using Inspiration, Water Filtration Project, Food Chain/Food Web Learning Centers, Public Service Announcement, QR coding/smart trail, Somers Point Eco-Tour

OTHER EVIDENCE Quizzes, Tests, Lab Writeups, Performance-based assessments

STAGE THREE

LEARNING PLAN

Chapter 1- Population and Communities
Living Things and the Environment
Populations
Interactions Among Living Things

Chapter 2- Ecosystems and Biomes
Energy Flow in Ecosystems
Cycles of Matter

Chapter 4- Land, Air and Water Resources
Air Pollution and Solutions
Water Pollution and Solutions

Unit Name: Diversity of Life **Time Frame: 12-13 weeks**
Author: Egg Harbor Township Science Curriculum Team

UNIT THREE

Subject: **Science** Country: **USA**
Course/Grade: **7th** State/Group: **NJ**
School: **Egg Harbor Township School District**

UNIT SUMMARY

Students understand that special structures are responsible for particular functions in organisms, and that for many organisms, the body is a system of multiple-interaction subsystems that form a hierarchy, from cells to the body. Also, students provide evidence to support their understanding of the structures and behaviors that increase the likelihood of successful reproduction by organisms. Students use conceptual and physical models to explain the transfer of energy and cycling of matter as they construct explanations for the role of photosynthesis in cycling matter in ecosystems. Students search for patterns in the evidence to support their understanding of the fossil record and how those patterns show relationships between modern organisms and their common ancestors. Finally, students construct explanations based on evidence to support fundamental understandings of natural selection and evolution.

UNIT RESOURCES

The Diversity Of Life, Pearson
Chapter 1- Introduction To Living Things
Chapter 3- Plants
Chapter 4- Introduction to Animals
Chapter 7- Animal Reproduction and Behavior

Internet Resource Links:
http://www.pearsonsuccessnet.com
http://www.discoveryeducation.com
http://www.brainpop.com
http://www.statedclearly.com

STAGE ONE

GOALS AND STANDARDS

MS-LS4-4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.
MS-LS4-2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
MS-LS1-6 Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
MS-LS1-3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
MS-LS1-4 Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

ENDURING UNDERSTANDINGS

The ability to carry out life functions determines is something is living or non-living.
Living things have requirements to carry out their life functions.
Classification is a method of organizing information into a meaningful structure or system.
In science, things are classified based upon the similarities of their shared characteristics.

Organisms are composed of systems that have specialized organs, tissues and cells that are used to carry out life processes.
Inherited mutations can lead to variations, which can become adaptations through natural selection over many generations.
There are many different types of plants, but they all have structures and functions that help ensure survival.
There are many different types of animals, but they all have structures and functions that help ensure survival.
Photosynthesis and respiration both play a role in helping cycle matter and energy throughout an organism.

ESSENTIAL QUESTIONS

How are living things alike yet different?

What characteristics help classify a plant?

What characteristics help classify an animal?

How does an animal's behavior help it survive and reproduce?

What role does photosynthesis play in cycling matter and energy?

How does the classification system help scientists differentiate the evolutionary process of different organsisms?

What role does reproduction play in the survival of different organisms?

Why is it important for individual organs to work together as organ systems in plants and animals?

KNOWLEDGE AND SKILLS

Introduction To Living Things
Plants
Introduction to Animals
Animal Reproduction and Behavior
Vocabulary:

Organ, Homeostasis, photosynthesis, respiration, taxonomy, evolution, natural selection, fertilization, embryo, zygote, pollination, gamete, pistil, stamen, Circulatory system, Digestive system, Respiratory system, binomial nomenclature

Distinguish between living and nonliving things.
Identify what living things need to survive.
Identify and **explain** characteristics organisms must have in order to sustain life.
Infer how early scientists classified living things.
Identify the 6 Kingdoms and indicate the shared characteristics of each.
Explain the system of binomial nomenclature.
Differentiate between prokaryotic and eukaryotic cells.
Compare cells, tissues, organs, and organ systems.
Explain and **illustrate** how the circulatory, digestive, and respiratory systems are interdependent.
Compare and **contrast** the benefits of asexual reproduction verse sexual reproduction.
Illustrate the structure and function of a flower's reproductive structures.

STAGE TWO

PERFORMANCE TASKS
Worm and Frog dissection, Male/Female Flower reproductive dissection, Animal Appendage STEM activity, hydroponics, Constructing DNA models with K*Nex, Taxonomy research project, Clearly stated evolution and natural selection activity, QR coding/Smart Trail.
OTHER EVIDENCE
Quizzes, Tests, Lab Writeups, Performance-based assessments

STAGE THREE

LEARNING PLAN
Chapter 1- Introduction To Living Things
- **1 What is Life?**
- **2 Classifying Life**
- **3 Domains and Kingdoms**
- **4 Evolution and Classification**

Chapter 3- Plants
- **1 What is a Plant?**
- **2 Classifying Plants**
- **3 Plant Structures**
- **4 Plant Reproduction**

Chapter 4- Introduction to Animals
- **1 What is an Animal?**
- **2 Animal Body Plans**
- **3 Introduction to Invertebrates**
- **4 Introduction to Vertebrates**
- **5 Vertebrate Diversity**

Chapter 7- Animal Reproduction and Behavior
- **1 Animal Reproduction and Fertilization**
- **2 Development and Growth**

Unit Name: Unit 1: Introduction to Chemistry **Time Frame: 20 weeks**
Author: Egg Harbor Township STEM Committee

UNIT

Subject:Science
Course/Grade:**8th**
School: **Egg Harbor Township School District**
Country: **USA**
State/Group: **NJ**

UNIT SUMMARY

As matter changes from one state to another, the distances and the forces between the particles change, and the amount of thermal energy in the matter changes. An atom is the smallest unit of an element and is made mostly of empty space. It contains a tiny nucleus surrounded by an electron cloud. Elements can join together by sharing, transferring, or pooling electrons to make chemical compounds. Atoms are neither created nor destroyed in chemical reactions. Energy can be released when chemical bonds form or absorbed when chemical bonds are broken.

UNIT RESOURCES

Introduction to Chemistry Pearson

Internet Resource Links:

https://www.**pearsonsuccessnet**.com
https://www.**brainpop**.com
www.**discoveryeducation**.com
https://**phet.colorado**.edu
www.pbslearningmedia.org
https://www.khanacademy.org/science/physics

STAGE ONE

GOALS AND STANDARDS

SCI.MS-PS1 Matter and Its Interactions

SCI.MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures.

SCI.MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

SCI.MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

SCI.MS-PS1-4 Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

SCI.MS-PS1-5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
SCI.MS-PS1-6 Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
SCI.MS-PS3 Energy
SCI.MS-PS3-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
SCI.MS-ETS1 Engineering Design
SCI.MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
SCI.MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
SCI.MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

ENDURING UNDERSTANDINGS

As matter changes from one state to another, the distances and the forces between the particles change, and the amount of thermal energy in the matter changes. An atom is the smallest unit of an element and is made mostly of empty space. It contains a tiny nucleus surrounded by an electron cloud. Elements can join together by sharing, transferring, or pooling electrons to make chemical compounds. Atoms are neither created nor destroyed in chemical reactions. Energy can be released when chemical bonds form or absorbed when chemical bonds are broken.

ESSENTIAL QUESTIONS

- How is matter described?
- Why does a substance change states?
- How is the periodic table organized?
- How can bonding determine the properties of a substance?
- How is matter conserved in a chemical reaction?
- What determines the properties of a solution?

KNOWLEDGE AND SKILLS

- Students will know
    - Describing matter
    - Classifying matter
    - Measuring matter
    - Changes in matter
    - States of matter
    - Changes of state
    - Gas behavior
    - Introduction to atoms
    - Organizing the elements
    - Metals
    - Nonmetals and metalloids
    - Atoms, bonding, and the periodic table
    - Observing chemical change
    - Describing chemical reactions
    - Describing acids and bases
    - Acids and bases in solution

- Students will be able to
    - Identify the properties used to describe matter.
    - Describe what makes up matter.
    - Describe the properties of a mixture.
    - Describe the units used to measure mass and volume.
    - Explain how to determine the density of a material.
    - Explain what a physical change is.
    - Explain what a chemical change is.
    - Describe how energy changes when matter changes.
    - Describe the motion of particles in a solid.
    - Describe the motion of particles in a liquid.
    - Describe the motion of particles in a gas.
    - Explain what happens to a substance during changes between solid and liquid.
    - Explain what happens to a substance during changes between liquid and gas.
    - Explain what happens to a substance during changes between solid and gas.
    - Explain how pressure and temperature of a gas are related.

- Explain how volume and temperature of a gas are related.
- Explain how pressure and volume of a gas are related.
- Describe how atomic theory developed.
- Describe the modern model of the atom.
- Explain how Mendeleev discovered the pattern that led to the periodic table.
- Identify the data about elements found in the periodic table.
- Explain how the periodic table is useful.
- Summarize the properties of metals.
- Describe how metals are classified in the periodic table.
- Explain what determines an element's chemistry.
- Explain how changes in matter can be described.
- Identify ways to tell that a chemical reaction has occurred.
- Identify the information included in a chemical equation.
- Explain how mass is conserved during a chemical reaction.
- Identify three categories of chemical reactions.
- Describe the properties of acids.
- Describe the properties of bases.
- Identify the types of ions acids and bases form in water.
- Describe what happens in a neutralization reaction.

STAGE TWO

PERFORMANCE TASKS
Foldables, Web-Quests, Labs, Kahoot, BrainPop, STEM Projects

OTHER EVIDENCE
Tests, Quizzes, Lab Reports, Review and Reinforce Worksheets, Assess Your Understanding Worksheets, Enrich Worksheets

STAGE THREE

LEARNING PLAN

- Chapter 1: Introduction to Matter
  - Lesson 1: Describing Matter
  - Lesson 2: Classifying Matter
  - Lesson 3: Measuring Matter
  - Lesson 4: Changes in Matter

- Chapter 2: Solids, Liquids, and Gases
    - Lesson 1: States of Matter
    - Lesson 2: Changes of State
    - Lesson 3: Gas Behavior

- Chapter 3: Elements and the Periodic Table
    - Lesson 1: Introduction to Atoms
    - Lesson 2: Organizing the Elements
    - Lesson 3: Metals
    - Lesson 4: Nonmetals and Metalloids

- Chapter 4: Atoms and Bonding
    - Lesson 1: Atoms, Bonding and the Periodic Table
    - Lesson 2: Ionic Bonds
    - Lesson 3: Covalent Bonds

- Chapter 5: Chemical Reactions
    - Lesson 1: Observing Chemical Change
    - Lesson 2: Describing Chemical Reactions
    - Lesson 3: Controlling Chemical Reactions

- Chapter 6: Acids, Bases, and Solutions
    - Lesson 1: Understanding Solutions
    - Lesson 2: Concentration and Solubility
    - Lesson 3: Describing Acids and Bases

Suggested Activities:

- Read, discuss, and complete lesson activities
- Review and Reinforce and/or Enrich when appropriate
- Small group discussions
- Graphic organizers
- Identify main ideas of the lesson
- Manipulatives
- Web-Quests
- Labs
- Videos

Unit Name: Unit 2: Forces and Energy **Time Frame: 15 weeks**
Author: Egg Harbor Township STEM Committee

UNIT

Subject:Science
Course/Grade:**8th**
School: **Egg Harbor Township School District**

Country: **USA**
State/Group: **NJ**

UNIT SUMMARY

Core concepts and principles of science and use measurement and observation tools to assist in categorizing,representing, and interpreting the natural and designed world. An object's motion changes if a net force acts on the object. Energy causes change by affecting the movement and position of objects. Energy can be transformed from one form to another and transferred from object to object. Thermal energy can be transferred by conduction, radiation, and convection. Thermal energy also can be transformed into other forms of energy.

UNIT RESOURCES

Forces and Energy Pearson

Internet Resource Links:

https://www.**pearsonsuccessnet**.com
https://www.**brainpop**.com
www.//**discoveryeducation**.com
https://**phet.colorado**.edu
www.pbslearningmedia.org
https://www.khanacademy.org/science/physics

STAGE ONE

GOALS AND STANDARDS

SCI.MS-PS2-2 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

SCI.MS-PS2-1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

SCI.MS-PS2-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

SCI.MS-PS2-5 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

SCI.MS-PS3 Energy

SCI.MS-PS3-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

SCI.MS-PS3-2 Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

SCI.MS-PS3-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

SCI.MS-PS3-4 Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the
sample.

SCI.MS-PS3-5 Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

SCI.MS-ETS1 Engineering Design

SCI.MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment
that may limit possible solutions.

SCI.MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

SCI.MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for
success.

SCI.MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

ENDURING UNDERSTANDINGS

Core concepts and principles of science and use measurement and observation tools to assist in categorizing,representing, and interpreting the natural and designed world. An object’s motion changes if a net force acts on the object. Energy causes change by affecting the movement and position of objects. Energy can be transformed from one form to another

and transferred from object to object. Thermal energy can be transferred by conduction, radiation, and convection. Thermal energy also can be transformed into other forms of energy.

ESSENTIAL QUESTIONS

- How do you describe the motion of an object?
- How do objects react to forces?
- How do machines make it easier to do work?
- How is energy conserved in a transformation?
- How does heat flow from one object to another?
- How does an electric circuit work?

KNOWLEDGE AND SKILLS

- Students will know
    - Describing Motion
    - Speed and velocity
    - Acceleration
    - The Nature of Force
    - Friction and Gravity
    - Newton's Laws of Motion
    - Momentum
    - Free Fall and Circular Motion
    - Work and Power
    - Understanding Machines
    - Inclined Planes and Levers
    - Putting Machines Together
    - What is Energy
    - Energy Transformation and Conservation
    - Temperature, Thermal Energy, and Heat
    - The Transfer of Heat
    - Thermal Properties
    - Electric Charge and Static Electricity
    - Electric Current
    - Electric Power and Safety

- Students will be able to
    - Determine when an object is in motion.
    - Calculate an object's speed.
    - Describe what velocity is.
    - Demonstate how to graph motion.
    - Describe the motion of an object as it accelerates.
    - Demonstrate how to graph acceleration.
    - Describe what a force is.
    - Describe how balanced and unbalanced forces are related to an object's motion.
    - Describe friction and identifiy factors that determine the friction between two objects.
    - Identify the factors that affect the gravitational force between two objects.
    - State Newton's first law of motion.
    - State Newton's second law of motion.
    - State Newton's third law of motion.
    - Explain how momentum is determined and conserved.
    - Describe the motion of an object during free fall.
    - Describe the factors that keep objects in orbit around Earth.
    - Define and calculate the work done on an object.
    - Define and calculate power.
    - Explain how machines make work easier.
    - Calculate the mechanical advantage of a machine.
    - Calculate the efficiency of a machine.
    - Describe and calculate the mechanical advantages of inclined planes, wedges, and screws.
    - Classify, describe, and calculate the mechanical advantage of levers.
    - Describe and calculate the mechanical advantage of pulleys and wheels and axles.
    - Describe and calculate the mechanical advantage of compound machines.
    - Explain how energy, work, and power are related.
    - Name and describe the two basic types of energy.
    - Explain how to determine an object's mechanical energy.
    - List other forms of energy.

- Explain how different forms of energy are related.
- State the law of conservation of energy.
- Explain temperature and how it is measured.
- Explain how heat is related to temperature and thermal energy.
- Describe the three forms of heat transfer.
- Use specific heat, conductors, and insulators, and thermal expansion to describe how materials respond to heat.
- Explain how electric charges and fields interact.
- Describe how static electricity builds up and transfer.
- Explain how an electric current is produced.
- Explain how conductors are different from insulators.
- Explain what causes current to flow and how resistance affects current.
- Describe the basic features of an electric series and parallel circuits.
- Explain how to calculate electric power and energy use.
- Describe measures that help protect people from electrical shocks and short circuits.
- Identify and describe the properties of magnets.
- Explain how magnetic poles interact.
- Describe a magnetic field.
- Describe Earth's magnetic field.
- Explain how electric current is related to magnetism.
- Identify some characteristic of a magnetic field produced by a current.
- Describe the characteristics of solenoids and electromagnets.
- Explain how electrical energy can be transformed into mechanical energy.
- Describe how galvanometers work.
- Describe how electric motors work.
- Explain how an electric current can be produced in a conductor.
- Describe how a generator works.
- Describe the function of a transformer.

STAGE TWO

PERFORMANCE TASKS

Foldables, Web-Quests, Labs, Kahoot, BrainPop, STEM Projects, Rocket Activity, Solar Panel Cars

OTHER EVIDENCE

Tests, Quizzes, Lab Reports, Review and Reinforce Worksheets, Assess Your Understanding Worksheets, Enrich Worksheets

STAGE THREE

LEARNING PLAN

- Chapter 1: Motion
  - Lesson 1: Describing Motion
  - Lesson 2: Speed and Velocity
  - Lesson 3: Acceleration

- Chapter 2: Forces
  - Lesson 1: The Nature of Force
  - Lesson 2: Friction and Gravity
  - Lesson 3: Newton's Laws of Motion
  - Lesson 4: Momentum
  - Lesson 5: Free Fall and Circular Motion

- Chapter 3: Work and Machines
  - Lesson 1: Work and Power
  - Lesson 2: Understanding Machines
  - Lesson 3: Inclined Planes and Levers
  - Lesson 4: Putting Machines Together

- Chapter 4: Energy
  - Lesson 1: What is Energy?
  - Lesson 2: Forms of Energy
  - Lesson 3: Energy Transformations and Conservation

- Chapter 5: Thermal Energy and Heat
  - Lesson 1: Temperature, Thermal Energy, and Heat
  - Lesson 2: The Transfer of Heat
  - Lesson 3: Thermal Properties

- Chapter 6: Electricity
  - Lesson 1: Electric Charge and Static Electricity
  - Lesson 2: Electric Current

    - Lesson 3: Electric Circuits
    - Lesson 4: Electric Power and Safety

- Chapter 7: Magnetism and Electromagnetism
    - Lesson 1: What is Magnetism?
    - Lesson 2: Magnetic Fields
    - Lesson 3: Electromagnetic Force
    - Lesson 4: Electricity, Magnetism, and Motion
    - Lesson 5: Electiricty from Magnetism

Suggested Activities:

- Read, discuss, and complete lesson activities
- Review and Reinforce and/or Enrich when appropriate
- Small group discussions
- Graphic organizers
- Identify main ideas of the lesson
- Manipulatives
- Web-Quests
- Labs
- Videos

Unit Name: Unit 3: Sound and Light **Time Frame: 5 weeks**
Author: Egg Harbor Township STEM Committee

UNIT

Subject:Science
Course/Grade:**8th**
School: **Egg Harbor Township School District**

Country: **USA**
State/Group: **NJ**

UNIT SUMMARY

Waves transfer energy without transferring matter. Mechanical waves require a medium. A continuous wave is a regular repeating sequence of wave pulses. Interference occurs when two or more waves move through a medium at the same time. Sound is a pressure variation transmitted through matter as a longitudinal wave. Sound is produced by vibrating objects in matter.

UNIT RESOURCES

Sound and Light Pearson

Internet Resource Links:

https://www.pearsonsuccessnet.com
https://www.brainpop.com
www.//discoveryeducation.com
https://phet.colorado.edu
www.pbslearningmedia.org
https://www.khanacademy.org/science/physics

STAGE ONE

GOALS AND STANDARDS

SCI.MS-PS4 Waves and Electromagnetic Radiation

SCI.MS-PS4-1 Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

SCI.MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through a various materials.

SCI.MS-ETS1 Engineering Design

SCI.MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment
that may limit possible solutions.

SCI.MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

SCI.MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for
success.
SCI.MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

ENDURING UNDERSTANDINGS

Core concepts and principles of science and use measurement and observation tools to assist in categorizing,representing, and interpreting the natural and designed world. An object's motion changes if a net force acts on the object. Energy causes change by affecting the movement and position of objects. Energy can be transformed from one form to another and transferred from object to object. Thermal energy can be transferred by conduction, radiation, and convection. Thermal energy also can be transformed into other forms of energy.

ESSENTIAL QUESTIONS

- What are the properties of waves?
- What determines the pitch and loudness of sound?
- What kinds of waves make up the electromagnetic spectrum?
- How does light interact with matter?

KNOWLEDGE AND SKILLS

- Students will know
    - What are Waves
    - Properties of Waves
    - Interactions of Waves
    - The Nature of Sound
    - Properties of Sound
    - Music
    - Hearing Sound
    - Using Sound
    - The Nature of Electromagnetic Waves
    - Waves of the Electromagnetic Spectrum
    - Wireless Communication
    - Light and Color

- Reflection and Mirrors
- Refraction and Lenses
- Seeing Light
- Using Light

- Students will be able to
  - Explain what causes mechanical waves.
  - List and describe three types of mechanical waves.
  - Describe the basic properties of waves.
  - Explain how a wave's speed is related to its wavelength and frequency.
  - Describe how reflection, refraction, and diffraction change a wave's direction.
  - State the different types of interference.
  - Explain how standing waves form.
  - Define sound.
  - Identify factors that affect the speed of sound.
  - State what the pitch of a sound depends on.
  - Identify factors that affect the loudness of a sound.
  - Explain what causes the Doppler effect.
  - Identify what determines the sound quality of a musical instrument.
  - Describe the function of the human ear.
  - Describe how animals and people are sound.
  - State what an electromagnetic waves consists of.
  - List and describe the models that explain the behavior of electromagnetic waves.
  - Explain how electromagnetic waves are alike and how they are different.
  - Describe the waves that make up the electromagnetic spectrum.
  - Explain how radio waves transmit information.
  - Explain how cell phones work.
  - Explain how communications satellites work.
  - Describe what determines the color of an opaque, transparent, or translucent objects.
  - Explain how mixing pigments is different from mixing light.
  - Identify the kinds of reflection.
  - Describe the types of images produced by plane, concave, and convex mirrors.
  - Explain why light rays bend when they enter a medium at an angle.

- Identify what determines the types of images formed by convex and concave lenses.
- Explain how one sees objects.
- Explain how cameras, telescopes, and microscopes work.

STAGE TWO

PERFORMANCE TASKS
Foldables, Web-Quests, Labs, Kahoot, BrainPop, STEM Projects, Rocket Activity, Solar Panel Cars

OTHER EVIDENCE
Tests, Quizzes, Lab Reports, Review and Reinforce Worksheets, Assess Your Understanding Worksheets, Enrich Worksheets

STAGE THREE

LEARNING PLAN

- Chapter 1: Characteristics of Waves
  - Lesson 1: What are Waves?
  - Lesson 2: Properties of Waves
  - Lesson 3: Interactions of Waves

- Chapter 2: Sound
  - Lesson 1: The Nature of Sound
  - Lesson 2: Properties of Sound
  - Lesson 3: Music
  - Lesson 4: Hearing Sound
  - Lesson 5: Using Sound

- Chapter 3: Electromagnetic Waves
  - Lesson 1: The Nature of Electromagnetic Waves
  - Lesson 2: Waves of Electromagnetic Spectrum
  - Lesson 3: Wireless Communication

- Chapter 4: Light
  - Lesson 1: Light and Color
  - Lesson 2: Reflection and Mirrors

- Lesson 3: Refraction and Lenses
- Lesson 4: Seeing Light
- Lesson 5: Using Light

Suggested Activities:

- Read, discuss, and complete lesson activities
- Review and Reinforce and/or Enrich when appropriate
- Small group discussions
- Graphic organizers
- Identify main ideas of the lesson
- Manipulatives
- Web-Quests
- Labs
- Videos