MS - ESS1 - Earth's Place in the Universe

NGSS:

Students who demonstrate understanding can:

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.]

MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.
[Clarification Statement: Emphasis is on how analyses of rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history. Examples of Earth's major events could range from being very recent (such as the last Ice Age or the earliest fossils of homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.] [Assessment Boundary: Assessment does not include recalling the names of specific periods or epochs and events within them.]

Big Ideas:

Eastampton Township School District
Curriculum Guide
Grade: 6, 8
Content Area: Earth & Space Science

ESS1.A: The Universe and Its Stars

- *Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.* ***(MS-ESS1-1)***
- *Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.* ***(MS-ESS1- 2)***

ESS1.B: Earth and the Solar System

- *The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.****(MS-ESS1-2),(MSESS1-3)***
- *This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.****(MS-ESS1-1)***
- *The solar system appears to have formed from a disk of dust and gas, drawn together by gravity.****(MS-ESS1-2)***

ESS1.C: The History of Planet Earth

- *The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale.* ***(MS-ESS1-4)***

Performance Expectations

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. *Develop and use a model to describe phenomena.* ***(MS-ESS1-1),(MS-ESS1- 2)***	**ESS1.A: The Universe and Its Stars** *Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.* ***(MS-ESS1-1)*** *Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.* ***(MS ESS1-2)***	**Patterns** *Patterns can be used to identify cause - and-effect relationships.* ***(MS-ESS1-1)*** *Graphs, charts, and images can be used to identify patterns in data.* ***(MS LS4-1),(MS-LS4-3)*** **Scale, Proportion, and Quantity** *Time, space, and energy phenomena*

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

Analyze and interpret data to determine similarities and differences in findings. ***(MS-ESS1-3)***

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6– 8 builds on K– 5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. ***(MS ESS1- 4)***

ESS1.B: Earth and the Solar System

The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. ***(MS-ESS1-2),(MSESS1-3)***

This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. ***(MS-ESS1-1)***

The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. ***(MS-ESS1- 2)***

ESS1.C: The History of Planet Earth

The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. ***(MS-ESS1- 4)***

can be observed at various scales using models to study systems that are too large or too small. ***(MS-ESS1-3),(MS ESS1-4)***

Systems and System Models

Models can be used to represent systems and their interactions. ***(MS ESS1-2)***

Connections to Engineering,Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology

Engineering advances have led to important discoveries in virtually every field of science and scientific discoveries have led to the development of entire industries and engineered systems. ***(MSESS1-3)***

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and

			observation. ***(MS ESS1-1),(MS-ESS1-2)***	

Eastampton Township School District

Curriculum Guide
Grade: 6, 8
Content Area: Earth & Space Science

	The chart above entitled "Performance Expectations" is reproduced verbatim from A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas.	

Essential Questions:

● How does Earth's place in the universe affect life on Earth? ● What is the role of gravity in the motions of objects in ourSolar System?

● How does Earth's moon affect tides on Earth?

● How would our lives be different if the Earth was not tilted on its axis?

● Why are scale models important when studying space?

Enduring Understandings:

● Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying explanations.

● Minerals, rocks, and soils are formed by processes that occur above and within Earth's crust.

● The Earth's surface features The Earth's surface has changed dramatically over time, and changes continue to occur. Changes in the Earth's surface are caused by natural processes such as erosion, deposition and plate tectonics.

● The Earth is billions of years old. Fossils provide evidence that life existed at least 3.5 billion years ago, and that living things have changed over time.

● Describe the main components of the Solar System and explain how the Sun, Moon, and Earth interact to

cause day, year, seasons, phases of the Moon and eclipses.

● A model of something is similar to, but not exactly like, the thing being modeled. Some models are physically similar to what they are representing, but others are not.

Knowledge, Skills, and Understandings:

Knowledge and Skills

It is expected that students will:

- explain why fossils are more likely to occur in sedimentary rocks e Describes how fossil evidence can be linked to environmental conditions and biological adaptations of the past.
- describe the parts and motions of the Solar System (Sun, planets, moons, asteroids, comets).
- compare and contrast the characteristics of the Sun, Moon and Earth.
- examine and explain the scientific theories on the formation of our Solar System, Earth, and Moon. ● distinguish objects in the Solar System from those outside it e Sequences pictures of phases of the Moon and explain why the Moon appears to change shape.
- draw a sketch that shows the position of the Sun, Earth, and Moon to explain the new and fullmoons. ● explains solar and lunar eclipses.
- create and utilize a model to:
    - demonstrate how the Earth rotates with respect to the Sun resulting in day and night.
    - demonstrate how the tilt and orbit of Earth result in seasons.
    - demonstrate how the Earth orbits the Sun resulting in a year.
- explain how gravity affects the movement of the Sun, Moon and Earth.
- compare and contrast the internal and external characteristics of planets.
- create a model of the relative size of planets, given a scale to use.

- show the relative distances between planets, given a scale to use.
- evaluate several ways that Earth differs from the other planets.
- explain the destination, purposes, challenges and history of spaceexploration.
- describe the components of the universe in terms of galaxies, stars and solarsystems.

Understandings

1. Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted 2. Seasonal patterns of sunrise and sunset can be observed, described, and predicted
3. There are different patterns of sunrise and sunset in the four different seasons throughout the year.

Instructional Materials/Resources:

***Materials include, but are not limited to:**

- Science Binders / Engineering Notebook
- index cards
- various recycled materials for prototyping
- safety goggles
- non-latex gloves
- magnifying glasses
- measuring tools
    - o ruler
    - o yard stick
    - o meter stick
    - o tape measures
    - o stopwatch
    - o architect scale
    - o thermometer

Suggested Vocabulary

- Planetary System
- Asteroid
- Meteoroid
- Comet
- Astronomical unit
- Rotation
- Axis
- Revolution
- Orbit
- Ellipse
- season
- Axial tilt
- Phases
- First quarter
- Third quarter
- Gravity

- Construction material
    - o paper
    - o scissors
    - o glue
    - o tape
    - o markers
    - o crayons
    - o staplers
    - o holepunch
- Chemistry lab equipment
- Eclipse

Technology:

- Active board
- Ipads
- Computers
- Internet access

- o beakers
- o flasks
- o graduated cylinders
- o pippett
- o Etc.

- Demonstration materials
  - o marbles
  - o rubber bands
  - o non-latex balloons
  - o bowling ball
  - o feathers
  - o flashlights
  - o batteries
  - o
- Plant materials
  - o seeds
  - o soil
  - o peat moss
  - o UV Light
  - o containers
  - o planters
  - o shovel
  - o prepared and blank
- **Book(s):** *"Environmental Science"* Prentice Hall, *"Weather and Climate"* Prentice Hall, *"Astronomy"* Prentice Hall, *"The Nature of Science and Technology"* Prentice Hall

Recommended Instructional Activities:

The below link will take you to the NGSS website where you can find numerous lessons/activities that correspond to the standards. http://ngss.nsta.org/classroom-resources-results.aspx?CoreIdea=1

- **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.
  - ○ http://ngss.nsta.org/Resource.aspx?ResourceID=6

- **MS-ESS1-3** Analyze and interpret data to determine scale properties of objects in the solarsystem. ○ http://ngss.nsta.org/Resource.aspx?ResourceID=69

Extension Strategies/Activities: **Modification Strategies/Activities:**

- **Everything you need to know about the MOON! Great for a web quest/scavenger hunt/discovery activity**

  http://www.moonconnection.com/
- **Moon Phases -** Search "Oreo Cookie Moon Phase" There are many lesson plans that come up. Many that come up are for K-2, but they can be altered for middle school.
- **Seasons Interactive -** where you can change the angle of the planet -

  http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::800::600::/sites/dl/free/0072482621/78778/Seasons_Nav.swf::Seasons%20Interactive
- **Wearable Science Project** - Phases of the Moon Apron - http://www.sciencewear.net/lunar-cycle.html
- **Navigate the NGSS** - Access to interactive lessons on solar system, scales of planets and orbits, and analysis of different planets. - http://concord.org/ngss/?gclid=CIWFx7D2p8ICFYqIfgodoEwAQ
- **Earth/Sun/Moon Relationships -** Lesson plans with models of the earth/moon/sun relationships https://solarsystem.nasa.gov/planets/profile.cfm?Object=Moon&Display=Educ&Page=1
- **Diameter of the Sun -** Fill in the diameter of the Sun you want your model to be scaled by - http://www.exploratorium.edu/ronh/solar_system/
- **Scale Model of the Solar System -** Several lesson plans for building scale models of the solar system. Contains common season and moon misconceptions. http://www.lpi.usra.edu/education/workshops/phasesSeasons/ ● **Lunar Phases -** Lessons/ activities for lunar phases, eclipses, formation, geology, and missions **-** http://www.lpi.usra.edu/education/resources/s_system/moon.shtml ● **Solar System & Beyond** - NASA Resources including video, images and current information. http://www.nasa.gov/topics/universe/
- **Space Math -** 360 page pdf with 5th through 12th grade single page activities - http://spacemath.gsfc.nasa.gov/YOSS/YOSS.pdf
- **Moon Songs -** Phases of the moon simulator and songs. Many links to sites featuring simulators -

- Review
- Reinforce
- Reteach
- Enrich
- Performance Assessment

Writing ● Graphic Organizers

- Word Bank
- Extra Time
- Study Guide

https://sites.google.com/site/sciencemrshardt/earth spacescience/astronomy

- **Gravity Simulator -** Simulator that allows students to manipulate the size of the sun and Earth to see how gravity, orbit, and velocity

will be affected - https://phet.colorado.edu/en/simulation/gravity-and orbits

- **Tide Simulator** - Simulator that allows students tomanipulate variables to see how orbits and tides are affected. Simulator includes multiple bodies orbiting a single star - http://sunshine.chpc.utah.edu/Labs/Tides/index.html
- **Projectile Motion Simulator -** Students can simulate how far an object will land based upon certain factors. https://phet.colorado.edu/en/simulation/projectile-motion
- **Hubble Telescope -** Virtual Hubble telescope allows students to view bodies by visible light, x-rays, or radio waves - http://hubblesite.org/explore_astronomy/black_holes/modules.html ● **Neil de Grasse Tyson -** Perspective on aliens. Interesting perspective - http://www.wimp.com/onaliens/
- **Earth Science week** - Classroom activities categorized byNGSS http://www.earthsciweek.org/classroom-activities/ngss
- **NGSS Lesson Resources** - http://www.lascifair.org/wp content/uploads/2012/09/NGSS-Lesson-resources-Maben.pdf ● **Lesson Plans Exploring NGSS** - http://www.resa.net/curriculum/curriculum/science/professionaldevel opment/ngss-pd/lesson-plans-exploring-ngss/

Grade Level Curriculum Outlines:

6th Grade

DNA & Heredity

- Invention of the Microscope
- Cell Organelles
- Cellular Respiration
- Traits
- Cloning
- Genetic Diseases

Electricity & Magnetism

- Magnetism

Eastampton Township School District
Curriculum Guide
Grade: 6, 8

Content Area: Earth & Space Science

- Magnetic Earth
- SImple Circuits
- Electrical Safety
- Electromagnetism

Inside Earth

- Layers of the Earth
- Plate Tectonics
- Earthquakes
- Sea-floor Spreading

Sound & Light

- Electromagnetic Spectrum
- Sight & Hearing
- Solar
- Reflection & Refraction
- Opaque, Translucent, & Transparent

8th Grade

Environmental Science

- Populations and Communities

- Ecosystems and Biomes
- Living Resources
- Land, Water, and Air Resources
- Energy Resources

Chemical Interactions

- Atoms and Bonding
- Chemical Reactions
- Acids, Bases,and Solutions
- Carbon Chemistry

Astronomy

- Earth, Moon, and Sun

- Exploring Space
- The Solar System
- Stars, Galaxies, and the Universe

Weather and Climate

- The Atmosphere
- Weather Factors
- Weather Patterns
- Climate and Climate Change

Cross-curricular Connections/Standards:

Common Core State Standards Connections:

ELA/Literacy –

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS1-3),(MS-ESS1-4)

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ESS1-3)

WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS1-4)

SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (MS-ESS1-1),(MS-ESS1-2)

Mathematics –

MP.2 Reason abstractly and quantitatively. (MS-ESS1-3)

MP.4 Model with mathematics. (MS-ESS1-1),(MS-ESS1-2)

6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS ESS1-1),(MS-ESS1-2),(MS-ESS1-3)
7.RP.A.2 Recognize and represent proportional relationships between quantities.(MS-ESS1-1),(MS-ESS1-2),(MS-ESS1-3)

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified

set. (MS-ESS1-2),(MS-ESS1-4)

7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-ESS1-2),(MS-ESS1-4)

Technology
8.1.5.A.2
8.1.5.A.4
8.1.5.A.5

21st Century Life and Careers
9.2.8.B.1
CRP1
CRP2

Suggested Assessments:

- Tests & quizzes
- Current Science Assignments
- Classwork on various topics
- Homework Assignments
- Differentiated Projects
- Teacher observations
- Discussion/Class participation
- Lab Reports

Modifications for SpEd/ESL/Students at Risk/Gifted

Supports, Accommodations, and Modifications must be provided as stated in IEP, 504 Plan or I-Team Intervention Plan, and may include (but not limited to) the following:

Presentation accommodations:

· Listen to audio recordings instead of reading text
· Learn content from audio books, movies, videos and digital media instead of reading print versions
· Use alternate texts at lower readability level
· Work with fewer items per page or line and /or materials in a larger print size
· Use magnification device, screen reader, or Braille/Nemeth Code
· Use audio amplification device (e.g., hearing aide(s), auditory trainer, sound-field system(which may require teacher use of microphone) · Be given a written lists of instructions
· Record a lesson, instead of taking notes
· Have another student share class notes with him
· Be given an outline of lesson
· Be given a copy of teacher's lecture notes
· Be given a study guide to assist in preparing for assessments
· Use visual presentations of verbal material, such as word webs and visual organizers

· Use manipulatives to teach or demonstrate concepts
· Have curriculum materials translated into native language

Response accommodations:

· Use sign language, a communication device, Braille, other technology, or native language other than English · Dictate answers to a scribe
· Capture responses to an audio recorder
· Use a spelling dictionary or electronic spell-checker
· Use a word processor to type notes or give responses in class
· Use a calculator or table or "math facts"
· Respond directly in the test booklet rather than on an answer sheet.

Setting accommodations:

· Work or take a test in a different setting, such as quiet room with few distractions
· Sit where he learns best (for example, near the teacher, away from distractions)
· Use special lighting or acoustics
· Take a test in small group setting
· Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
· Use noise buffers such as headphones, earphones, or earplugs

Timing accommodations:

· Take more time to complete a task or a test
· Have extra time to process oral information and directions
· Take frequent breaks, such as after completing a task

Scheduling accommodations:

· Take more time to complete a project
· Take a test in several timed sessions or over several days
· Take sections of a test in a different order
· Take a test at a specific time of day

Organization skills accommodations:

· Use an alarm to help with time management
· Mark texts with a highlighter
· Have help coordinating assignments in a book or planner
· Receive study skills instruction

Assignment modifications:

· Complete fewer or different homework problems than peers
· Write shorter paper
· Answer fewer or different test questions
· Create alternate projects or assignments

Curriculum modifications:

· Get graded or assessed using a different standard than the one for classmates

Eastampton Township School District
Curriculum Guide
Grade: 6, 8
Content Area: Earth & Space Science

MS - ESS2 - Earth's Systems

NGSS:

Students who demonstrate understanding can:

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-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
[Clarification Statement: Emphasis is on how processes change Earth's surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate.]

MS-ESS2-3. Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
[Clarification Statement: Examples of data include similarities of rock and fossil types on different continents, the shapes of the continents (including continental shelves), and the locations of ocean structures (such as ridges, fracture zones, and trenches).] [Assessment Boundary: Paleomagnetic anomalies in oceanic and continental crust are not assessed.]

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-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions
[Clarification Statement: Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within

probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).] [Assessment Boundary: Assessment does not include recalling the names of cloud types or weather symbols used on weather maps or the reported diagrams from weather stations.]

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.
[Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations.] [Assessment Boundary: Assessment does not include the dynamics of the Coriolis effect.]

Big Ideas:

ESS1.C: The History of Planet Earth

- *Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor attrenches.* ***(HS.ESS1.C GBE)*** *(secondary to* ***MS-ESS2-3)***

ESS2.A: Earth's Materials and Systems

- *All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms.* ***(MS-ESS2-1)***
- *The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future.* ***(MS ESS2-2)***

ESS2.B: Plate Tectonics and Large-Scale System Interactions

- *Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart.****(MS-ESS2-3)***

ESS2.C: The Roles of Water in Earth's Surface Processes

- *Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land.****(MS-ESS2-4)***
- *The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns.* ***(MSESS2-5)*** ● *Global movements of water and its changes in form are propelled by sunlight and gravity.****(MS-ESS2-4)*** ● *Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents.* ***(MS-ESS2-6)***
- *Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations.* ***(MS-ESS2-2)***

Eastampton Township School District
Curriculum Guide
Grade: 6, 8

Content Area: Earth & Space Science

ESS2.D: Weather and Climate

- *Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.* ***(MS-ESS2-6)***
- *Because these patterns are so complex, weather can only be predicted probabilistically.****(MS-ESS2-5)*** ● *The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents.* ***(MS-ESS2-6)***

Performance Expectations

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts

	Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. *Develop and use a model to describe phenomena.* ***(MSESS2-1),(MS-ESS2- 6)*** *Develop a model to describe unobservable mechanisms.* ***(MS-ESS2- 4)*** **Planning and Carrying Out Investigations** Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.	**ESS1.C: The History of Planet Earth** *Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches.* ***(HS.ESS1.C GBE)*** *(secondary to* ***MS ESS2-3)*** **ESS2.A: Earth's Materials and Systems** *All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms.* ***(MS-ESS2-1)*** *The planet's systems interact over scales that range from microscopic to global in size, and they operate over*	**Patterns** *Patterns in rates of change and other numerical relationships can provide information about natural systems.* ***(MS ESS2-3)*** **Cause and Effect** *Cause and effect relationships may be used to predict phenomena in natural or designed systems.* ***(MSESS2-5)*** **Scale, Proportion, and Quantity** *Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.* ***(MS-ESS2- 2)*** **Systems and System Models** *Models can be used to represent systems and their interactions—such as inputs, processes and outputs— and energy, matter, and information flows*	

*Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. **(MS-ESS2-5)***

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

*Analyze and interpret data to provide evidence for phenomena. **(MS-ESS2-3)***

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K– 5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that

*fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. **(MS-ESS2-2)***

ESS2.B: Plate Tectonics and Large-Scale System Interactions

*Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. **(MS-ESS2-3)***

ESS2.C: The Roles of Water in Earth's Surface Processes

*Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. **(MS-ESS2-4)***

*The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. **(MSESS2-5)***

*Global movements of water and its changes in form are propelled by sunlight and gravity. **(MS-ESS2-4)***

*within systems. **(MS-ESS2-6)***

Energy and Matter

*Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. **(MS-ESS2-4)***

Stability and Change

*Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. **(MS ESS2-1)***

	describe nature operate today as they did in the past and will continue to do			

		Variations in density due to variations in temperature and salinity drive a		

	so in the future. ***(MS-ESS2-2)*** --- **Connections to Nature of Science** Scientific Knowledge is Open to Revision in Light of New Evidence *Science findings are frequently revised and/or reinterpreted based on new evidence.* ***(MS-ESS2-3)***	*global pattern of interconnected ocean currents.* ***(MS-ESS2-6)*** *Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations.* ***(MS-ESS2-2)*** **ESS2.D:** **Weather and Climate** *Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.* ***(MS-ESS2-6)*** *Because these patterns are so complex, weather can only be predicted probabilistically.* ***(MS-ESS2- 5)*** *The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents.* ***(MS-ESS2-6)***		

The chart above entitled "Performance Expectations" is reproduced verbatim from A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas.

Essential Questions:	Enduring Understandings:
● What can the geological time scale tell us about the history of the Earth?	● Water evaporates from the surface of the earth, rises and cools, condenses into rain or snow, and falls again to the surface.
● What cycles and processes shaped the surface of the Earth? ● What are the complex factors that create weather?	● Weather and climate result from interactions of the atmosphere with Earth's other systems ● The atmosphere is a dynamic system driven by energy from the sun. ● The atmosphere's properties and composition are related to its physical structure. ● The Earth's surface features The Earth's surface has changed dramatically over time, and changes continue to occur. Changes in the Earth's surface are caused by natural processes such as erosion, deposition and plate tectonics. ● Minerals, rocks, and soils are formed by processes that occur above and within Earth's crust.

Knowledge, Skills, and Understandings:

Knowledge and Skills

It is expected that students will:

- create a diagram depicting the rock cycle.
- create a written explanation of what is occurring during each phase of the rock cycle.
- compare the different types of boundaries and what features they cause.
- design a model demonstrating weathering via water, ice, or wind.
- analyze the validity of Plate TectonicTheory.

- collect meteorological data over a period of time.
- analyze meteorological data to determine cause and effect relationships.
- predict future weather using meteorological data.
- describe how unequal heating and the rotation of the Earth causes changes in regional climates.
- describe the types of climates and currents onEarth.

Understandings

1. The geological timescale is used to organize the Earth's history.
2. The surface of the Earth changes over time.
3. Faults in the surface of the Earth indicate how the Earth has changed overtime.
4. Erosion can be caused by wind, water, and ice.
5. The Theory of Plate Tectonics is supported by several pieces of evidence.
6. Rocks change over time, and these changes are described in the rock cycle.
7. Water goes through physical changes during the water cycle.
8. Factors like temperature and pressure influence changes in the weather, causing regional variations.

Instructional Materials/Resources:

***Materials include, but are not limited to:**

- Science Binders / Engineering Notebook
- index cards
- various recycled materials for prototyping
- safety goggles
- non-latex gloves
- magnifying glasses
- measuring tools
    - o ruler
    - o yard stick
    - o meter stick
    - o tape measures
    - o stopwatch
    - o architect scale
    - o thermometer
- Construction material
    - o paper

Suggested Vocabulary

- climate
- weather
- coriolis effect
- water table
- water cycle
- mantle
- conduction
- convection
- radiation
- plate tectonics
- continental drift
- seafloor spreading
- earthquake
- epicenter
- volcano
- the rock cycle
- sediment
- sedimentary rock
- metamorphic rock

- scissors
- glue
- tape
- markers
- crayons
- staplers
- holepunch

- Chemistry lab equipment
  - beakers
  - flasks
  - graduated cylinders
  - pippett
  - Etc.
- Demonstration materials
  - marbles
  - rubber bands
  - non-latex balloons
  - bowling ball
  - feathers
  - flashlights

- magma
- igneous rock
- reason for the seasons
- silt
- rift
- fault
- seismic waves
- subduction zone
- ring of fire
- oceanic-continental convergence
- richter scale
- atmosphere
- hydrosphere
- geosphere
- biosphere
- thermosphere
- mesosphere
- stratosphere
- troposphere

- o batteries
- o
- Plant materials
  - o seeds
  - o soil
  - o peat moss
  - o UV Light
  - o containers
  - o planters
  - o shovel
  - o prepared and blank
- **Book(s):** *"Environmental Science"* Prentice Hall, *"Weather and Climate"* Prentice Hall, *"Astronomy"* Prentice Hall, *"The Nature of Science and Technology"* Prentice Hall

Technology:

- Active board
- Ipads
- Computers
- Internet access

Recommended Instructional Activities:

The below link will take you to the NGSS website where you can find numerous lessons/activities that correspond to the standards. http://ngss.nsta.org/classroom-resources-results.aspx?CoreIdea=1

- **MS-ESS2-3** Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past platemotions.

- http://ngss.nsta.org/Resource.aspx?ResourceID=131
- http://ngss.nsta.org/Resource.aspx?ResourceID=140

Extension Strategies/Activities:

- **SEPM Activities and Lessons -** includes Paleogeographic Mapping, Plate Movements and Climate Change, Determining Diet of Ancient Animals, Modeling an Explosive Volcano, Seafloor Spreading, and many more: http://www.beloit.edu/sepm/activity age.html
- **The Paleontology Portal -** can click through different time periods to see a description of the paleontology and geology of that time, and a gallery of fossils found. Can look specifically at Nevada - http://paleoportal.org/index.php?globalnav=time_space&sectionnav= state&state_id=34&period_id=17
- **Earth's Timeline -** Short video that relates the age of the Earth to a timeline students can better relate to https://www.youtube.com/watch?v=tkxWmh-tFGs
- **Weathering Resources** - Resources showing weathering, erosion, and deposition http://science class.net/Geology/weathering_erosion/WED.htm
- **Earth science activities** - Various resources and activites related to Earth Science - http://geocntr.org/educationresources/classroom activities/
- **Carbon's Role** - Video (3min) explains Carbon's role in Global Climate - http://www.npr.org/2007/05/01/9943298/episode-1-its-all about-carbon
- **Earth's Magnetic Field** - Discovery video provides overview of Earth's magnetic field https://www.youtube.com/watch?v=yEYy_nVC4L0
- **Rock Cycle** - computer interactive rock cycle - http://www.learner.org/interactives/rockcycle/index.html
- **Earth Science week** - Classroom activities categorized byNGSS http://www.earthsciweek.org/classroom-activities/ngss
- **NGSS Lesson Resources** - http://www.lascifair.org/wp content/uploads/2012/09/NGSS-Lesson-resources-Maben .pdf
- **Lesson Plans Exploring NGSS** - http://www.resa.net/curriculum/curriculum/science/professionaldevel opment/ngss-pd/lesson-plans-exploring-ngss/

Modification Strategies/Activities:

- Review
- Reinforce
- Reteach
- Enrich
- Performance Assessment
- Writing
- Graphic Organizers
- Word Bank
- Extra Time
- Study Guide

Grade Level Curriculum Outlines:

Eastampton Township School District
Curriculum Guide
Grade: 6, 8
Content Area: Earth & Space Science

6th Grade

DNA & Heredity

- Invention of the Microscope
- Cell Organelles
- Cellular Respiration
- Traits
- Cloning
- Genetic Diseases

Electricity & Magnetism

- Magnetism
- Magnetic Earth
- SImple Circuits
- Electrical Safety
- Electromagnetism

Inside Earth

- Layers of the Earth
- Plate Tectonics
- Earthquakes
- Sea-floor Spreading

Sound & Light

- Electromagnetic Spectrum
- Sight & Hearing
- Solar
- Reflection & Refraction
- Opaque, Translucent, & Transparent

8th Grade

Eastampton Township School District
Curriculum Guide
Grade: 6, 8
Content Area: Earth & Space Science

- Populations and Communities
- Ecosystems and Biomes
- Living Resources
- Land, Water, and Air Resources
- Energy Resources

Chemical Interactions

- Atoms and Bonding
- Chemical Reactions
- Acids, Bases,and Solutions
- Carbon Chemistry

Astronomy

- Earth, Moon, and Sun
- Exploring Space
- The Solar System
- Stars, Galaxies, and the Universe

Weather and Climate

- The Atmosphere
- Weather Factors
- Weather Patterns
- Climate and Climate Change

Cross-curricular Connections/Standards:

Common Core State Standards Connections:

ELA/Literacy –

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS2-2),(MS-ESS2-3),(MS ESS2-5)

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ESS2-3)

RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ESS2-3),(MS-ESS2-5)

WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS2-2)

WHST.6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources. (MS-ESS2-5)

SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (MS-ESS2-1),(MS-ESS2-2),(MSESS2-6)

Mathematics –

MP.2 Reason abstractly and quantitatively. (MS-ESS2-2),(MS-ESS2-3),(MS-ESS2-5)

6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-ESS2-5)

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS2-2),(MS-ESS2-3)

7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-ESS2-2),(MS-ESS2-3)

Technology
8.1.5.A.2
8.1.5.A.4
8.1.5.A.5

21st Century Life and Careers
9.2.8.B.1
CRP1
CRP2

Suggested Assessments:

- Tests & quizzes
- Current Science Assignments
- Classwork on various topics
- Homework Assignments
- Differentiated Projects
- Teacher observations
- Discussion/Class participation
- Lab Reports

Modifications for SpEd/ESL/Students at Risk/Gifted

Supports, Accommodations, and Modifications must be provided as stated in IEP, 504 Plan or I-Team Intervention Plan, and may include (but not limited to) the following:

Presentation accommodations:

· Listen to audio recordings instead of reading text
· Learn content from audio books, movies, videos and digital media instead of reading print versions
· Use alternate texts at lower readability level
· Work with fewer items per page or line and /or materials in a larger print size
· Use magnification device, screen reader, or Braille/Nemeth Code
· Use audio amplification device (e.g., hearing aide(s), auditory trainer, sound-field system(which may require teacher use of microphone) · Be given a written lists of instructions
· Record a lesson, instead of taking notes
· Have another student share class notes with him
· Be given an outline of lesson
· Be given a copy of teacher's lecture notes
· Be given a study guide to assist in preparing for assessments
· Use visual presentations of verbal material, such as word webs and visual organizers
· Use manipulatives to teach or demonstrate concepts
· Have curriculum materials translated into native language

Response accommodations:

· Use sign language, a communication device, Braille, other technology, or native language other than English · Dictate answers to a scribe
· Capture responses to an audio recorder
· Use a spelling dictionary or electronic spell-checker
· Use a word processor to type notes or give responses in class
· Use a calculator or table or "math facts"
· Respond directly in the test booklet rather than on an answer sheet.

Setting accommodations:

· Work or take a test in a different setting, such as quiet room with few distractions
· Sit where he learns best (for example, near the teacher, away from distractions)

· Use special lighting or acoustics
· Take a test in small group setting

· Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
· Use noise buffers such as headphones, earphones, or earplugs

Timing accommodations:
· Take more time to complete a task or a test
· Have extra time to process oral information and directions
· Take frequent breaks, such as after completing a task

Scheduling accommodations:
· Take more time to complete a project
· Take a test in several timed sessions or over several days
· Take sections of a test in a different order
· Take a test at a specific time of day

Organization skills accommodations:
· Use an alarm to help with time management
· Mark texts with a highlighter
· Have help coordinating assignments in a book or planner
· Receive study skills instruction

Assignment modifications:
· Complete fewer or different homework problems than peers
· Write shorter paper
· Answer fewer or different test questions
· Create alternate projects or assignments

Curriculum modifications:
· Get graded or assessed using a different standard than the one for classmates

MS-ETS1 - Engineering Design

NGSS:

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.

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

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.

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.

Big Ideas:

- The Engineering Design Process is a method that is used to solve technological challenges to change and improve products for the way we live.

ETS1.A: Defining and Delimiting Engineering Problems

- The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. **(MS-ETS1-1)**

ETS1.B: Developing Possible Solutions

- A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. **(MS-ETS1-4)** ● There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **(MS-ETS1-2), (MS-ETS1-3)**
- Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. **(MS-ETS1-3)**
- Models of all kinds are important for testing solutions.**(MS-ETS1-4)**

ETS1.C: Optimizing the Design Solution

- Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. **(MS-ETS1-3)**
- The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.**(MS-ETS1-4)**

Performance Expectations		
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Asking Questions and Defining Problems Asking questions and defining problems in grades 6–8 builds from grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models. *Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.* ***(MS-ETS1-1)*** **Developing and Using Models** Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. *Develop a model to generate data to*	**ETS1.A: Defining and Delimiting Engineering Problems** *FThe more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions.* ***(MS-ETS1-1)*** **ETS1.B: Developing Possible Solutions** *A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.* ***(MS-ETS1-4)*** *There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.* ***(MS-ETS1-2),*** ***(MS-ETS1-3)*** *Sometimes parts*	**Influence of Science, Engineering, and Technology on Society and the Natural World** *All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.* ***(MS-ETS1-1)*** *The uses of technologies and limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.* ***(MS-ETS1-1)***

		of different solutions		

	test ideas about designed systems, including those representing inputs and outputs. ***(MS-ETS1-4)*** **Analyzing and Interpreting Data** Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. *Analyze and interpret data to determine similarities and differences in findings.* ***(MS-ETS1-3)*** **Engaging in Argument from Evidence** Engaging in argument from evidence in 6–8 builds from K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world. *Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.* ***(MS-ETS1-2)***	*can be combined to create a solution that is better than any of its predecessors.* ***(MS-ETS1-3)*** *Models of all kinds are important for testing solutions.* ***(MS-ETS1-4)*** **ETS1.C: Optimizing the Design Solution** *Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design.* ***(MS ETS1-3)*** *The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.* ***(MS-ETS1-4)***		

Essential Questions:

1. What is the design process and how is it used?

2. Why is brainstorming important when modifying or improving a product?

3. Why do people work in teams when solving design problems?

4. What is meant by constraints and criteria?

Enduring Understandings:

- The Engineering Design Process is a method that is used to solve technological challenges to change and improve products for the way we live.

Eastampton Township School District
Curriculum Guide
Grade: 6 -8 Content Area: Engineering Technology & Application of Science

5. Which step in the design process uses a design brief? Why? 6. Which step in the design process uses a decision matrix?Why? 7. Why are design elements considered when engineers and designers invent or innovate a product?

Knowledge, Skills, and Understandings:

Knowledge and Skills

It is expected that students will:

- Describe the design process and how it is used to aid in problemsolving.
- Describe the elements of design.
- Recognize design criteria and constraints.
- Describe the purpose and importance of working in a team.
- Use the design process to solve a technical problem.
- Apply the elements of design to the design process.
- Explain a design brief and apply the concept when using the design process.
- Operate effectively as a member of a team to complete a design project.
- Use a decision matrix to select the best solution to a design.

Understandings

1. Many different design processes are used to guide people in developing solutions to problems. 2. The design brief is a tool for defining the problem; it is an agreement between the engineer and client. 3. Engineers use design briefs to explain the problem, identify solution expectations, and establish project constraints. 4. Design teams use brainstorming techniques to generate large numbers of ideas in a short amount of time, striving for quantity, not quality.

5. A decision matrix is a tool used to compare solution ideas to the criteria so that you can select the best solution.

Instructional Materials/Resources:

- Interactive Engineering Notebook
- RecycledMaterials
  - o Cans / water bottles
  - o paper rolls

Suggested Vocabulary

- engineer
- Design Process
- prototype
- evaluate
- technical drawing
- design

- o egg cartons
- o ect.

- PLTW equipment
  - o Specific for each Gateway Course
  - o computer access

- innovation
- constraints
- engineering notebook
- designer

Technology:

- computers
- iPads
- tablets
- 3D CAD programs
  - o Revit
  - o Inventor
- Computer Programming Platforms
  - o RobotC
  - o Python

Recommended Instructional Activities:

In grades 6 - 8 our students all take Project Lead the Way (PLTW) Gateway courses. We offer all 9 of the following courses:

Gateway:

- Design & Modeling (DM)
- Automation & Robotics (AR)
- Green Architecture (GA)
- Energy & the Environment (EE)
- Flight & Space (FS)
- Science of Technology (ST)
- Magic of Electrons (ME)
- Medical Detectives (MD)
- Intro to Computer Science I & II (ICS)

Extension Strategies/Activities:

Shark Tank:

- Using the Design Process, students can solve a real world problem oftheir own choosing and in tandem with the math and science teachers present their solution to community members forfeedback.

Modification Strategies/Activities:

- guided notes
- online resources
- extended time when necessary
- differentiated instruction

Cross-curricular Connections/Standards:

Connections to MS-ETS1.A: Defining and Delimiting Engineering Problems include:
Physical Science: MS-PS3-3
Connections to MS-ETS1.B: Developing Possible Solutions Problems include:
Physical Science: MS-PS1-6, MS-PS3-3, Life Science: MS-LS2-5
Connections to MS-ETS1.C: Optimizing the Design Solution include:

Physical Science: MS-PS1-6

Common Core State Standards Connections:

ELA/Literacy:

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3)

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ETS1-3)

RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ETS1-2),(MS-ETS1-3)

WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-ETS1-2)

WHST.6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources. (MS ETS1-1)

WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-ETS1-2)

SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (MS ETS1-4)

Mathematics:

MP.2 Reason abstractly and quantitatively. (MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3),(MS-ETS1-4)

7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. (MS-ETS1-1),(MS ETS1-2),(MS-ETS1-3)

7.SP Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (MS-ETS1-4)

Technology
8.1.5.A.2
8.1.5.A.4
8.1.5.A.5

21st Century Life and Careers
9.2.8.B.1

CRP1

CRP2

Eastampton Township School District
Curriculum Guide
Grade: 6 -8 Content Area: Engineering Technology & Application of Science

Suggested Assessments:

- Presentations
- Projects
- Performance Evaluations
- Practicum
- Homework
- Exit tickets

Eastampton Township School District
Curriculum Guide
Grade: 6 -8 Content Area: Engineering Technology & Application of Science

Modifications for SpEd/ESL/Students at Risk/Gifted

Supports, Accommodations, and Modifications must be provided as stated in IEP, 504 Plan or I-Team Intervention Plan, and may include (but not limited to) the following:

Presentation accommodations:

· Listen to audio recordings instead of reading text
· Learn content from audio books, movies, videos and digital media instead of reading print versions
· Use alternate texts at lower readability level
· Work with fewer items per page or line and /or materials in a larger print size
· Use magnification device, screen reader, or Braille/Nemeth Code
· Use audio amplification device (e.g., hearing aide(s), auditory trainer, sound-field system(which may require teacher use of microphone) · Be given a written lists of instructions
· Record a lesson, instead of taking notes
· Have another student share class notes with him
· Be given an outline of lesson
· Be given a copy of teacher's lecture notes
· Be given a study guide to assist in preparing for assessments
· Use visual presentations of verbal material, such as word webs and visual organizers
· Use manipulatives to teach or demonstrate concepts
· Have curriculum materials translated into native language

Response accommodations:

· Use sign language, a communication device, Braille, other technology, or native language other than English · Dictate answers to a scribe
· Capture responses to an audio recorder
· Use a spelling dictionary or electronic spell-checker
· Use a word processor to type notes or give responses in class

· Use a calculator or table or “math facts”
· Respond directly in the test booklet rather than on an answer sheet.

Setting accommodations:
· Work or take a test in a different setting, such as quiet room with few distractions
· Sit where he learns best (for example, near the teacher, away from distractions)
· Use special lighting or acoustics
· Take a test in small group setting

· Use sensory tools such as an exercise band that can be looped around a chair’s legs (so fidgety kids can kick it and quietly get their energy out)
· Use noise buffers such as headphones, earphones, or earplugs

Timing accommodations:
· Take more time to complete a task or a test
· Have extra time to process oral information and directions

· Take frequent breaks, such as after completing a task

Scheduling accommodations:
· Take more time to complete a project
· Take a test in several timed sessions or over several days
· Take sections of a test in a different order
· Take a test at a specific time of day

Organization skills accommodations:
· Use an alarm to help with time management
· Mark texts with a highlighter
· Have help coordinating assignments in a book or planner
· Receive study skills instruction

Assignment modifications:
· Complete fewer or different homework problems than peers
· Write shorter paper
· Answer fewer or different test questions
· Create alternate projects or assignments

Curriculum modifications:
· Get graded or assessed using a different standard than the one for classmates

Eastampton Township School District
Curriculum Guide
Grade: 6, 7, and 8
Content Area: Life Science

MS-LS1 From Molecules to Organisms: Structure & Processes

NGSS:

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 nonliving 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.]

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.
[Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds, and creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury.]

MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
[Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water.

Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds.] [Assessment Boundary: Assessment does not include genetic mechanisms, gene regulation, or biochemical processes.]

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.
[Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.] [Assessment Boundary: Assessment does not include the biochemical mechanisms of photosynthesis.]

MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
[Clarification Statement: Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released.] [Assessment Boundary: Assessment does not include details of the chemical reactions for photosynthesis or respiration.]

MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
[Assessment Boundary: Assessment does not include mechanisms for the transmission of this information.]

Big Ideas:

- **LS1.A: Structure and Function**
  - All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1) Text*:"From Bacteria to Plants" Prentice Hall*
  - Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2) Text: *"Cells and Heredity" PrenticeHall* ○ In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3) Text *"Human Biology and Health" Prentice Hall*
- **LS1.B: Growth and Development of Organisms**
  - Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4) *"Cells and Heredity" Prentice Hall*
  - Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4) Text*:"From Bacteria to Plants" Prentice Hall*
  - Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5)Text*:"From Bacteria to Plants" Prentice Hall, "Cells and Heredity" Prentice Hall*
- **LS1.C: Organization for Matter and Energy Flow inOrganisms**
  - Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, whichalso

releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1- 6)Text*:"From Bacteria to Plants" Prentice Hall*, *"Cells and Heredity" Prentice Hall*

- Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7)Text*:"From Bacteria to Plants" Prentice Hall*, *"Cells and Heredity" Prentice Hall,* Text *"Human Biology and Health" Prentice Hall* ● **LS1.D: Information Processing**
  - Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1- 8) Text *"Human Biology and Health" PrenticeHall*
- **PS3.D: Energy in Chemical Processes and Everyday Life**
  - The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary to MS-LS1-6) Text*:"From Bacteria to Plants" Prentice Hall*, *"Cells and Heredity" Prentice Hall*
  - Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)Text*:"From Bacteria to Plants" Prentice Hall*, *"Cells and Heredity" Prentice Hall,* Text *"Human Biology and Health" Prentice Hall*

Eastampton Township School District
Curriculum Guide
Grade: 6, 7, and 8
Content Area: Life Science

Performance Expectations

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

Develop and use a model to describe phenomena. ***(MS-LS1-2)***

Develop a model to describe unobservable mechanisms.
(MS LS1-7)

Planning and Carrying Out Investigations

Planning and carrying out investigations in 6-8 builds on K 5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.

Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. ***(MS-LS1-1)***

Constructing Explanations and Designing Solutions

LS1.A: Structure and Function

All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). ***(MS-LS1-1)***

Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. ***(MS-LS1-2)***

In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. ***(MS-LS1-3)***

LS1.B: Growth and Development of Organisms

Animals engage in characteristic behaviors that increase the odds of reproduction. ***(MS-LS1-4)***

Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. ***(MS-LS1-4)***

Cause and Effect

Cause and effect relationships may be used to predict phenomena in natural systems. ***(MS-LS1-8)***

Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. ***(MS-LS1-4),(MSLS1-5)***

Scale, Proportion, and Quantity

Phenomena that can be observed at one scale may not be observable at another scale. ***(MS-LS1-1)***

Systems and System Models

Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. ***(MS-LS1-3)***

Energy and Matter

Matter is conserved because atoms are conserved in physical and chemical processes. ***(MS-LS1-7)***

Within a natural system, the transfer of energy drives the motion and/or cycling of matter. ***(MS-LS1- 6)***

Structure and Function

Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural

			structures/systems can be analyzed to determine how they	

Eastampton Township School District
Curriculum Guide
Grade: 6, 7, and 8
Content Area: Life Science

Essential Questions:	**Enduring Understandings:**
● How do cells carry out all the functions necessary for an organism's growth and health? ● How do the body systems work together to carry out all the functions necessary for an organism's growth and health? ● What are the characteristic behaviors that increase the success at reproduction? ● What are the specialized features and ways that increase the success of plant reproduction? ● How do genetic factors and local conditions affect the growth of adult plants? ● How do plants get their energy for growth and development? ● How does animal digestion work? ● How do our sensory receptors help us react to stimuli in the environment? ● How does photosynthesis work? ● How does cellular respiration work? ● How do the structures of organisms contribute to life's functions? ● How do matter and energy move through individual organisms and ecosystems? ● How does genetic variation among organisms in species affect survival and reproduction?	● All living things are made up of living cells and organisms can be single celled or multicellular. ● Each cell has structures (organelles) that have a function, including a cell membrane around the cell that affects traffic in and out. ● Cells make up tissues, which make up organs, which make up organ systems, which work together to form a functioning multicellular organism. ● Animals have characteristic behaviors to increase their success at reproduction (i.e. courtship behaviors, etc.). ● Plants reproduce in many ways - also to increase their reproductive success. ● Plant growth is affected by genetics and local conditions where it grows. ● Plants (and green algae) use photosynthesis to create energy for growth and storage while releasing oxygen. ● Animals break down consumed food through a series of chemical reactions that release energy to support their

	growth and repair. ● Animals have sensory receptors that brings in signals from the world and transmit

	them to the brain for a reaction (and to build a memory collection for future use) and they can be electromagnetic, mechanical,

	chemical. ● The chemical process (of photosynthesis) that produces sugars needs sunlight for its energy and uses carbon dioxide and water, while releasing oxygen. ● Cellular respiration in plants and animals involves chemical reactions with oxygen that releases energy and carbon dioxide.

Knowledge, Skills, and Understandings:

Knowledge

It is expected that students will:

- Conduct investigation using a microscope to observe cells.
- Distinguish between living/nonliving.
- Develop and use models to show how cell parts work together.
- Distinguish between plant and animal cells.
- Use argument based on evidence to support how systems work together in an organism.
- Use oral or written argument to prove that animal behaviors affect survival.
- Use oral or written argument to demonstrate that specialized plant structures increase survivalrates. ● Explain how energy flows in and out of organisms.
- Cite evidence to communicate the scientific explanation of the change of matter and energy through photosynthesis. ● Use evidence to communicate the scientific explanation of the change of matter and energy through cellular respiration. (Ex. CO_2 and bromothymol blue)

Skills

- access information
- implement innovations
- think creatively

● make judgments and decisions

● manage goals and time

Understandings

Identify the phenomenon under investigation:

● From the given investigation plan, students identify and describe* the phenomenon under investigation, which includes the idea that living things are made up of cells.

● Identify and describe the purpose of the investigation, which includes providing evidence for the following ideas: that all living things are made of cells (either one cell or many different numbers and types of cells) and that the cell is the smallest unit that can be said to be alive.

● All living things are made up of living cells and that organisms can be single celled or multicellular. ● Each cell has structures (organelles) that have a function, including a cell membrane around the cell that affects traffic in and out. ● Cells make up tissues, which make up organs, which make up organ systems, which work together to forma functioning multicellular organism.

● Animals have characteristic behaviors to increase their success at reproduction (i.e. courtship behaviors,etc.). ● Plants reproduce in many ways - also to increase their reproductive success.

● Plant growth is affected by genetics and local conditions where itgrows.

● Plants (and green algae) use photosynthesis to create energy for growth and storage while releasingoxygen. ● Animals break down consumed food through a series of chemical reactions that release energy to support their growth and repair.

● Animals have sensory receptors that brings in signals from the world and transmit them to the brain for a reaction (and to build a memory collection for future use) and they can be electromagnetic, mechanical,chemical.

● Chemical process (of photosynthesis) that produces sugars needs sunlight for its energy and uses carbon dioxideand water, while releasing oxygen.

● Cellular respiration in plants and animals involves chemical reactions with oxygen that releases energy and carbon dioxide.

Instructional Materials/Resources:	**Suggested Vocabulary**

****Materials include, but are not limited to:**

- Science Binders / Engineering Notebook
- index cards
- various recycled materials for prototyping
- safety goggles
- non-latex gloves
- magnifying glasses
- measuring tools
    - ruler
    - yard stick
    - meter stick
    - tape measures
    - stopwatch
    - architect scale
    - thermometer
- Construction material
    - paper
    - scissors
    - glue
    - tape
    - markers
    - crayons
    - staplers
    - holepunch
- Chemistry lab equipment
    - beakers
    - flasks
    - graduated cylinders
    - pippett
    - Etc.
- Demonstration materials
    - marbles
    - rubber bands
    - non-latex balloons
    - bowling ball
    - feathers
    - flashlights
    - batteries
    -
- Plant materials
    - seeds

- microscopic
- multicellular
- unicellular
- prokaryotic
- eukaryotic
- organelles
- nucleus
- chloroplasts
- mitochondria
- cell membrane
- cell wall
- tissue
- organ
- organ system
- organism
- circulatory
- excretory
- digestive
- respiratory
- muscular
- nervous
- stamen
- pistil
- stigma
- migration
- radiant energy
- chemical energy
- chlorophyll
- chloroplast
- cellular respiration
- conservation of matter and energy

Technology:

- Active board
- Ipads
- Computers
- Internet access

- o soil
- o peat moss
- o UV Light
- o containers
- o planters
- o shovel
- o prepared and blank

● **Book(s):** *"From Bacteria to Plants"* Prentice Hall, *"Cells and Heredity"* Prentice Hall, Text *"Human Biology and Health"* Prentice Hall, "*Environmental Science*" Prentice Hall, and "*DNA & Heredity*" Prentice Hall.

Recommended Instructional Activities:

"From Bacteria to Plants" Prentice Hall

● **Mystery Object**: Study a mystery object for several days to determine whether or not it is alive.**MS-LS1-5** ● **Video Script:** You are narrating a video called Living on Land, which is written from the perspective of a plant. Write a one-page script for your narration. Be sure to discuss the challenges that life on land poses for plants and how they meet their needs.(***MS-LS1-4***)

"Cells and Heredity" Prentice Hall

● Ask students to examine a drop of tap water under the microscope. Most likely, the water will not contain microorganisms, but it could possibly contain non-disease-causing ones, as treated tap water is not stering.(**MS-LS1- 2**)

● Challenge the students to model an animal cell using recyclable materials.(**MS-LS1-2**)

"Human Biology and Health" Prentice Hall

● "What do you exhale?" Students will use two test tubes along with 10 mL of water and a few drops of bromothymol blue to compare the solutions. This teaches them whether carbon dioxide is present in exhaled hair. (**secondary to MS-LS1-7)**

Extension Strategies/Activities:

"Investigating Photosynthesis"

● http://ngss.nsta.org/Resource.aspx?ResourceID=170 (MS LS1-6)

● http://serc.carleton.edu/sp/mnstep/activities/35653.html ● Students design and conduct simple experiments using elodea (aquatic plant sold in pet stores) and Bromothymol blue to determine whether plants consume of release carbon dioxide in the process of photosynthesis. Students will record their data which will be used to conclude whether carbon dioxide was consumed of release by the elodea. Through class discussion of student data, students will learn that carbon

Modification Strategies/Activities:

- Review
- Reinforce
- Reteach
- Enrich
- Performance Assessment Writing
- Graphic Organizers
- Word Bank
- Extra Time
- Study Guide

Content Area: Life Science

dioxide was consumed during photosynthesis.

"Plants and Animals, Partners in Pollination"

- http://ngss.nsta.org/Resource.aspx?ResourceID=137(MS LS1- 4)
- This online unit explores the theme of the National Zoo's Pollinarium exhibition: how plant and animal partners interact to accomplish pollination. It is a series of three lessons that allow the learner to explore and develop an understanding of the relationship between flowers and bees to accomplish successful plant reproductions. Lesson 1: Identify the plant parts involved in reproduction, identify the animal (bee) structures involved in pollination, and demonstrate how pollen moves from the male stamen to the female stigma. Lesson 2: Interpret the links between pollination and food production. Lesson 3: Describe the complementary relationships between pollinators and the plants they pollinate, and identify adaptations that flowers have developed to "encourage" pollination. A PDF version also available at: http://www.smithsonianeducation.org/images/educators/le sson _plan/partners_in_pollination/pollen.pdf

"Effect of Environment on Plant Growth"

- http://ngss.nsta.org/Resource.aspx?ResourceID=206(MS LS1- 5)
- This activity demonstrates the effect of changes in the environment on the growth of plants. The plants are placed in environments such as high salinity, cold, heat, or drought and observe the different reactions (growth) of the plants to these conditions. Students discuss the desirability of breeding new types of plants that are better able to withstand these changes if they occur in the general environment. The objectives of this activity is to: 1. Plant, grow and maintain plants under different environmental treatment conditions. 2. Observe differences in plant growth between these treatments. 3. Compare the growth of treated plants with the growth of control plants. ● http://www.apsnet.org/EDCENTER/K 12/TEACHERSGUIDE/PLANTBIOTECHNOLOGY/Page s/A ctiv ity7.aspx

"No Ordinary Coronary"

● http://ngss.nsta.org/Resource.aspx?ResourceID=268(	

MS- ETS1-1)(MS-LS1-3)	

Eastampton Township School District
Curriculum Guide
Grade: 6, 7, and 8
Content Area: Life Science

● In this lesson, students become bioengineers, trying to effectively and safely restore "blood flow" through a model clogged artery. Background work, including dissection ideas, provides students with an understanding of circulatory system anatomy; it also piques their interest in heart disease and current technologies to combat it. The teacher establishes a problem: blockage of a coronary artery! Students see the model clogged artery (frosting in a plastic tube) and come up with ideas for clearing the artery, also generating goals and constraints for the process. With a set of predetermined materials, students create and test their method of clearing the artery, done by pouring water through the tube and measuring flow rate. Students then evaluate project designs, peer-review each other's work, modify designs, and retest. Wrap-up (assessment) is done through a report or poster-session, and students argue for which designs are best based on evidence in relation to the established criteria. ● http://static.nsta.org/files/ss1404_24.pdf	

Grade Level Curriculum Outlines:

6th Grade Curriculum Outline

DNA & Heredity

- Invention of the Microscope
- Cell Organelles
- Cellular Respiration
- Traits
- Cloning
- Genetic Diseases

Electricity & Magnetism

- Magnetism
- Magnetic Earth
- SImple Circuits
- Electrical Safety
- Electromagnetism

Eastampton Township School District
Curriculum Guide
Grade: 6, 7, and 8
Content Area: Life Science

Inside Earth

- Layers of the Earth
- Plate Tectonics
- Earthquakes
- Sea-floor Spreading

Sound & Light

- Electromagnetic Spectrum
- Sight & Hearing
- Solar
- Reflection & Refraction
- Opaque, TRanslucent, & Transparent

7th Grade Curriculum Outline

The Nature of Science and Technology

- What is Science?
- The Work of Scientists

- Technology and Engineering

Chemical Building Blocks

- Introduction to Matter
- Solids, Liquids, and Gases
- Elements and the Periodic Table
- Exploring Materials

From Bacteria to Plants

- Living Things
- Viruses and Bacteria
- Protists and Fungi
- Introduction to Plants
- Seed Plants

Human Biology and Health

- Bones, Muscles, and Skin
- Food and Digestion

- Circulation
- Respiratory and Excretion
- Fighting Disease
- The Nervous System
- The Endocrine System

Motion, Forces, and Energy

- Motion
- Forces
- Forces in Fluids
- Work and Machines
- Energy
- Thermal Energy and Heat

8th Grade Curriculum Outline

Environmental Science

- Populations and Communities
- Ecosystems and Biomes
- Living Resources
- Land, Water, and Air Resources
- Energy Resources

Chemical Interactions

- Atoms and Bonding
- Chemical Reactions
- Acids, Bases,and Solutions
- Carbon Chemistry

Astronomy

- Earth, Moon, and Sun
- Exploring Space
- The Solar System
- Stars, Galaxies, and the Universe

Weather and Climate

- The Atmosphere
- Weather Factors
- Weather Patterns
- Climate and Climate Change

Cross-curricular Connections/Standards:

Common Core State Standards Connections:

ELA/Literacy –

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3),(MS-LS1-4),(MS-LS1- 5),(MS-LS1-6)

RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. (MS-LS1-5),(MS-LS1-6)

RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. (MSLS1-3),(MS-LS1-4)

WHST.6-8.1 Write arguments focused on discipline content. (MS-LS1-3),(MS-LS1-4)

WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS1-5),(MS-LS1-6)

WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-LS1-1)

WHST.6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources. (MS-LS1-8)

WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS1-5),(MS-LS1-6)

SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS1-2),(MS-LS1-7)

Mathematics –

6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the

independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-1),(MS-LS1-2),(MS-LS1-3),(MS-LS1-6)

6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. (MSLS1-4),(MS-LS1-5)

6.SP.B.4 Summarize numerical data sets in relation to their context. (MS-LS1-4),(MS-LS1-5)

Technology
8.1.5.A.2
8.1.5.A.4
8.1.5.A.5

21st Century Life and Careers
9.2.8.B.1
CRP1
CRP2

Suggested Assessments:

- Tests & quizzes
- Current Science Assignments
- Classwork on various topics
- Homework Assignments
- Differentiated Projects
- Teacher observations
- Discussion/Class participation
- Lab Reports

Modifications for SpEd/ESL/Students at Risk/Gifted

Supports, Accommodations, and Modifications must be provided as stated in IEP, 504 Plan or I-Team Intervention Plan, and may include (but not limited to) the following:
Presentation accommodations:

· Listen to audio recordings instead of reading text
· Learn content from audio books, movies, videos and digital media instead of reading print versions
· Use alternate texts at lower readability level
· Work with fewer items per page or line and /or materials in a larger print size
· Use magnification device, screen reader, or Braille/Nemeth Code
· Use audio amplification device (e.g., hearing aide(s), auditory trainer, sound-field system(which may require teacher use of microphone) · Be given a written lists of instructions
· Record a lesson, instead of taking notes
· Have another student share class notes with him
· Be given an outline of lesson

· Be given a copy of teacher's lecture notes
· Be given a study guide to assist in preparing for assessments

· Use visual presentations of verbal material, such as word webs and visual organizers
· Use manipulatives to teach or demonstrate concepts
· Have curriculum materials translated into native language

Response accommodations:

· Use sign language, a communication device, Braille, other technology, or native language other than English ·
Dictate answers to a scribe
· Capture responses to an audio recorder
· Use a spelling dictionary or electronic spell-checker
· Use a word processor to type notes or give responses in class
· Use a calculator or table or "math facts"
· Respond directly in the test booklet rather than on an answer sheet.

Setting accommodations:

· Work or take a test in a different setting, such as quiet room with few distractions
· Sit where he learns best (for example, near the teacher, away from distractions)
· Use special lighting or acoustics
· Take a test in small group setting
· Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
· Use noise buffers such as headphones, earphones, or earplugs

Timing accommodations:

· Take more time to complete a task or a test
· Have extra time to process oral information and directions
· Take frequent breaks, such as after completing a task

Scheduling accommodations:

· Take more time to complete a project
· Take a test in several timed sessions or over several days
· Take sections of a test in a different order
· Take a test at a specific time of day

Organization skills accommodations:

· Use an alarm to help with time management
· Mark texts with a highlighter
· Have help coordinating assignments in a book or planner
· Receive study skills instruction

Assignment modifications:

· Complete fewer or different homework problems than peers
· Write shorter paper
· Answer fewer or different test questions
· Create alternate projects or assignments

Eastampton Township School District
Curriculum Guide
Grade: 6, 7, and 8
Content Area: Life Science

Curriculum modifications:

· Get graded or assessed using a different standard than the one for classmates

Eastampton Township School District
Curriculum Guide
Grade: 7,8
Content Area: Physical Science

MS-PS1- Matter and Its Interactions

NGSS:

MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.
[Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms.] [Assessment Boundary: Assessment does not include valence electrons and bonding energy, discussing the ionic nature of subunits of complex structures, or a complete depiction of all individual atoms in a complex molecule or extended structure.]

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.
[Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.] [Assessment Boundary: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.]

MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
[Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.] [Assessment Boundary: Assessment is limited to qualitative information.]

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.
[Clarification Statement: Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawings and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium.]

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.
[Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.] [Assessment Boundary: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.]

MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal

energy by chemical processes.*

[Clarification Statement: Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance. Examples of designs could involve chemical reactions such as dissolving ammonium chloride or calcium chloride.] [Assessment Boundary: Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.]

Big Ideas:

PS1.A: Structure and Properties of Matter

- Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.(MS-PS1-1)
- Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2),(MS-PS1-3)
- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. (MS-PS1-4) ● In a liquid, the molecules are constantly in contact with others;in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. (MS-PS1-4) ● Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1)
- The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. (MS-PS1-4)

PS1.B: Chemical Reactions

- Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2),(MS-PS1-3),(MS-PS1-5)
- The total number of each type of atom is conserved, and thus the mass does not change.(MS-PS1-5) ● Some chemical reactions release energy, others store energy. (MS-PS1-6)

Performance Expectations

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts

Developing and Using Models

Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.

Develop a model to predict and/or describe phenomena. ***(MS-PS1- 1),(MS-PS1-4)***

Develop a model to describe unobservable mechanisms. ***(MS-PS1- 5)***

Analyzing and Interpreting Datas

Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

Analyze and interpret data to determine similarities and differences in findings. ***(MS-PS1-2)***

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific

PS1.A: Structure and Properties of Matter

Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. ***(MS-PS1-1)***

Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. ***(MS-PS1-2),(MS-PS1-3)***

Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. ***(MS-PS1-4)***

In a liquid, the molecules are constantly in contact with others;in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. ***(MS-PS1-4)***

Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). ***(MS-PS1-1)***

The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. ***(MS-PS1-4)***

Patterns

Macroscopic patterns are related to the nature of microscopic and atomic-level structure. ***(MS-PS1-2)***

Cause and Effect

Cause and effect relationships may be used to predict phenomena in natural or designed systems. ***(MS-PS1-4)***

Scale, Proportion, and Quantity

Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. ***(MS-PS1-1)***

Energy and Matter

Matter is conserved because atoms are conserved in physical and chemical processes. ***(MS-PS1-5)***

The transfer of energy can be tracked as energy flows through a designed or natural system. ***(MS-PS1-6)***

Structure and Function

Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. ***(MS-PS1-3)***

---- ---- Connections to Engineering, Technology, and Applications of Science

Interdependence of Science,

	knowledge, principles, and theories.	**PS1.B: Chemical Reactions**	**Engineering, and Technology** *Engineering advances have led to important discoveries in virtually every field*	
			of science, and scientific discoveries have led to the development of entire industries and	

Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints. ***(MSPS1-6)*** **Obtaining, Evaluating, and Communicating Information** Obtaining, evaluating, and communicating information in 6–8 builds on K–5 and progresses to evaluating the merit and validity of ideas and methods. *Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.* ***(MS-PS1- 3)*** --- ***Connections to Nature of Science*** **Scientific Knowledge is Based on Empirical Evidence** *Science knowledge is based upon logical and conceptual connections between evidence and explanations.* ***(MS-PS1-2).*** **Science Models, Laws, Mechanisms, and Theories**	*Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.****(MS-PS1-2),(MS-PS1-3),(MS PS1-5)*** *The total number of each type of atom is conserved, and thus the mass does not change.* ***(MS-PS1-5)*** *Some chemical reactions release energy, others store energy.* ***(MS-PS1-6)*** **PS3.A: Definitions of Energy** *The term "heat" as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects.* ***(secondary to MSPS1-4)*** *The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system's material). The details of that*	*engineered systems.* ***(MS-PS1-3)*** ***Influence of Science, Engineering and Technology on Society and the Natural World*** *The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time.* ***(MS-PS1-3)***	

	Explain Natural Phenomena	*relationship depend on the type of atom or molecule and the*		

	Laws are regularities or mathematical descriptions of natural phenomena. ***(MS-PS1-5)***	*interactions among the atoms in the material. Temperature is not a direct measure of a system's total thermal energy. The total thermal energy (sometimes called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material.* ***(secondary to MS-PS1-4)*** **ETS1.B: Developing Possible Solutions** *A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.* ***(secondary to MS-PS1-6)*** **ETS1.C: Optimizing the Design Solution** *Although one design may not perform the best across all tests,identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of the characteristics may be incorporated into the new design.* ***(secondary to MS PS1-6)*** *The iterative process of testing the most promising solutions and*		

		modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. ***(secondary to MS-PS1-6)***		

Eastampton Township School District
Curriculum Guide

Grade: 7,8
Content Area: Physical Science

The chart above entitled "Performance Expectations" is reproduced verbatim from A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas.

Essential Questions:

- How do atomic and molecular interactions explain the properties of matter that we see and feel?
- How can one describe physical interactions between objects and within systems of objects?
- How can energy be transferred from one object or system to another?
- What are the characteristic properties of waves and how can they be used?
- What are the physical characteristics and chemical properties of pure substances?
- What happens at the molecular level in each state of matter and when matter changes between states?
- How can particles combine to produce a substance with different properties?

Enduring Understandings:

- Students will understand that matter's properties can be described by its energy, purity and arrangement of atoms.
- Students will understand that elements are made up of atoms whose properties are mainly determined by its electron configuration.

Knowledge, Skills, and Understandings:

Knowledge

It is expected that students will:

“Chemical Interactions” Prentice Hall Science Explorer

- Develop models of atomic composition of simple molecules and extended structures that vary in complexity.
- Describe relationships between components including:
  - Individual atoms, from two to thousands, combine to form molecules, which can be made up of the sametype of different types of atom.
  - Some molecules can connect to each other.

○ In some molecules, the same atoms of different elements repeat; in other molecules the same atom of a single element repeats.

"Chemical Building Blocks" Prentice Hall Science Explorer

- Organize given data about the characteristic physical and chemical properties (e.g., density, melting point, boiling point, solubility, flammability, odor).
- Analyze the data to identify patterns, including the changes in physical and chemical properties of each substance before and after the interaction.
- Obtain information from published, grade-level appropriate material from at least two sources (e.g., text, media, visual displays, data) about:
  - ○ Synthetic materials and the natural resources from which they are derived.
  - ○ Chemical processes used to create synthetic materials from natural resources (e.g., burning of limestone for the production of concrete).
  - ○ The societal need for the synthetic material (e.g., the need for concrete as a buildingmaterial). ● Students determine and describe* whether the gathered information is relevant fordetermining: ○ That synthetic materials, via chemical reactions, come from natural resources.
  - ○ The effects of the production and use of synthetic resources on society.
  - ○ Students determine the credibility, accuracy, and possible bias of each source of information, including the ideas included and methods described.
- Students synthesize information that is presented in various modes (e.g., graphs, diagrams, photographs, text, mathematical, verbal) to describe.
  - ○ How synthetic materials are formed, including the natural resources and chemical processes used. ○ The properties of the synthetic material(s) that make it different from the natural resource(s) from which itwas derived.
  - ○ How those physical and chemical properties contribute to the function of the syntheticmaterial. ○ How the synthetic material satisfies a societal need or desire through the properties of its structure and function.
  - ○ The effects of making and using synthetic materials on natural resources and society.

Skills

2. Building a prototype
3. Evaluating a design
4. Interpreting data
5. Communicating
6. Observing
7. Classifying
8. Drawing conclusions
9. Making models
10. Classroom expectations/rule
11. Lab safety equipment and procedures
12. Lab equipment identification and function
13. Definitions and samples of observation and inferences.
14. Lab expectations/ scientific method: to include: Purpose, Research, Hypothesis, Experiment, Analysis, Conclusion (Throughout the year)
15. Current Science expectations & importance
16. Skills for thinking critically
17. How to use the metric system (Conversions and Conversion Factors)

Understandings

"Chemical Building Blocks" Prentice Hall Science Explorer

● Matter can be described in terms of two kinds of properties, physical and chemicalproperties. ● A substance that undergoes a physical change is still the same substance after the change. ● Unlike a physical change, a chemical change produces new substances with properties different from those of the original substances. ● That synthetic materials, via chemical reactions, come from natural resources.

● Production and use of synthetic resources affect society.

"Chemical Interactions" Prentice Hall Science Explorer

● The atomic theory grew as a series of models that developed from experimentalevidence.

- Individual atoms, from two to thousands, combine to form molecules, which can be made up of the same type of different types of atom.
- Some molecules can connect to each other.
- In some molecules, the same atoms of different elements repeat; in other molecules the same atom of a single element repeats.

Instructional Materials/Resources:

****Materials include, but are not limited to:**

- Science Binders / Engineering Notebook
- index cards
- various recycled materials for prototyping
- safety goggles
- non-latex gloves
- magnifying glasses
- measuring tools
    - o ruler
    - o yard stick
    - o meter stick
    - o tape measures
    - o stopwatch
    - o architect scale
    - o thermometer
- Construction material
    - o paper
    - o scissors
    - o glue
    - o tape
    - o markers
    - o crayons
    - o staplers

Suggested Vocabulary

- matter
- chemistry
- substance
- physical property
- chemical property
- element
- atom
- chemical bond
- molecule
- compound
- chemical formula
- mixture
- heterogeneous mixture
- homogeneous mixture
- solution
- weight
- mass
- International System of Units
- volume
- density
- physical change
- chemical change
- law of conservation of mass
- energy

- o holepunch
- Chemistry lab equipment
  - o beakers
  - o flasks
  - o graduated cylinders
  - o pippett
  - o Etc.
- Demonstration materials

- temperature
- thermal energy
- temperature
- thermal energy
- endothermic change
- exothermic change
- solid
- liquid
- gas

- marbles
- rubber bands
- non-latex balloons
- bowling ball
- feathers
- flashlights
- batteries
-

- Plant materials
  - seeds
  - soil
  - peat moss
  - UV Light
  - containers
  - planters
  - shovel
  - prepared and blank
- **Book(s):** “Chemical Building Blocks” Prentice Hall Science Explorer “Chemical Interactions” Prentice Hall Science Explorer

- viscosity
- melting
- melting point
- freezing
- freezing point
- vaporization
- evaporation
- boiling
- boiling point
- condensation
- sublimation
- graph
- origin
- directly proportional
- nucleus
- proton
- neutron
- electrom
- atomic number
- isotope
- mass number
- model
- atomic mass
- periodic table
- chemical group
- period
- group
- metal
- malleable
- ductice

- conductivity
- reactivity
- corrosion
- alkali metal
- alkaline earth metal
- transition metal
- alloy
- particle accelerator
- nonmetal
- diatomic molecule
- halogen
- noble gas
- metalloid

- semiconductor

Technology:

- Active board
- Ipads
- Computers
- Internet access

Recommended Instructional Activities:

- **MS-PS1-1.** Develop models to describe the atomic composition of simple molecules and extendedstructures.
- **MS-PS1-2.** Analyze and interpret data on the properties of substances before and after the substances interactto determine if a chemical reaction has occurred.
- **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.
- Construct a physical model of simple molecules such as ammonia ormethanol.
- Write an essay that describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
- Do an investigation that uses physical characteristics and chemical properties to identify an unknownsubstance.

Extension Strategies/Activities:

● Students can work in groups to invent a polymer that can be a substitute for a natural material such as wood, cotton, or leather. They need to write an advertisement for their polymer, explaining why they think it is a good replacement for the natural material.

Chapter 4 Project. Chemical Building Blocks. PrenticeHall.

Teacher's edition

"Can You Copperplate?"

●

http://ngss.nsta.org/Resource.aspx?ResourceID=125(MS-PS1-2), (MS-ETS1-3)

● This lesson plan introduces students to the process of plating one metallic object with another metal and the importance of thisprocess in engineering applications. With parameters, students design strategies to copperplate other metal objects using pennies and a vinegar solution. After sharing their strategies with the class, students revise their plans then test their effectiveness. Groups come back together to share results and decide what strategy worked best or could work best. The lesson information provides significant, useful background information on the science and engineering involved in this process. It connects to disciplinary core ideas in middle school physical science and engineering design. ● http://tryengineering.org/lesson-plans/can-you-copperplate

"Balancing Chemical Equations"

Modification Strategies/Activities: ●

Review

● Reinforce

● Reteach

● Enrich

● Performance Assessment

Writing ● Graphic Organizers

● Word Bank

● Extra Time

● Study Guide

- http://ngss.nsta.org/Resource.aspx?ResourceID=150(MS-PS1-5) ● In this interactive simulation, users adjust the coefficients in an equation while the molecules are depicted in a box above the equation. This allows the users to visualize what the symbols in the chemical equation actually mean. They can count the number and kind of each atom and how a change in the coefficient changes the count of each atom. Once the equation is balanced, a big smiley face appears to indicate that the same number and type of atoms are present in the reactants and the products. In the introductory section, users can access a tool box in order to view a bar chart of each type of atom present in the reactants and products to reinforce the idea of what a balanced equation means. Alternatively, they can view a scale for each type of atom present that balances once the same number of each is reached on the reactant and product sides. After completing three introductory equations, the user can choose to play a game with varying levels of difficulty to reinforce the concepts.
- https://phet.colorado.edu/en/simulation/balancing-chemical equations

"Energy Changes in Chemical Reactions"

- http://ngss.nsta.org/Resource.aspx?ResourceID=151(MS-PS1-2) ● This is a 5E laboratory lesson plan about endothermic and exothermic reactions. Teaching resources include activity sheets for assessment, answer sheets, a variety of video clips and animations to support the students' learning of the concepts, background information for the teacher, and a test bank
- http://www.middleschoolchemistry.com/lessonplans/chapter6/lesson 7

"Design and Build a Biosuit"

- http://ngss.nsta.org/Resource.aspx?ResourceID=430(MS-ETS1- 1),(MS-PS1-2)
- The overarching unit has students learn about, design, and build biosuits - suits designed to protect people in potentially dangerous conditions while allowing for complex tasks to still be completed. This review focuses on lessons 3 and 4 of that two-week unit (comprised of 10, 50-minute lessons). These two lessons focus on examining design constraints for particular tasks given to teams of students, then conducting materials research based on those design constraints and planning for budgetary constraints.

The materials required to implement the lessons are generally things teachers would have on hand at home or in the classroom, or could ask students to bring to school (like a snorkel or kitchen gloves).

Several other science/engineering units are available in this series: https://www.teachingchannel.org/engineering-curriculum-boeing ● https://www.teachingchannel.org/biosuit-engineering-unit-boeing

"Changes of State"

● http://ngss.nsta.org/Resource.aspx?ResourceID=454(MS-PS1-4)

● This is the second chapter in the American Chemical Society (ACS) program Middle School Chemistry. This chapter contains five lessons or activities:

Heat, Temperature, and Conduction

Changing State—Evaporation

Changing State—Condensation

Changing State—Freezing

Changing State—Melting

Each lesson is outlined in a detailed lesson plan that follows the BSCS 5E instructional model. The exploration phase usually contains student activities followed in the explanation phase with a simple simulation that illustrates the particle behavior during conduction in the first lesson and during a phase change in the following lessons. The first lesson provides important background knowledge necessary to understand how energy is transferred in the subsequent phase changes.

Each lesson is outlined comprehensively in the lesson plan with extensive supporting materials such as background readings, student readings, and a chapter overview lecture. Each lesson begins with a series of questions as a way of helping students design an experiment. A well described experiment follows. The simulation that illustrates water molecules at different temperature is introduced to explain the observations in the experiment. The explanation is often extended with an additional activity on a closely related topic.

The website includes downloadable pdf documents for the lesson plans, the

entire chapter, student activity sheets and the answer sheet for the activity sheet and a student reader to be used at the end of the lesson.

- http://www.middleschoolchemistry.com/lessonplans/chapter2

Grade Level Curriculum Outlines:
7th Grade

Chemical Building Blocks
- Introduction to Matter
- Solids, Liquids, and Gases
- Elements and the Periodic Table
- Exploring Materials

From Bacteria to Plants
- Living Things
- Viruses and Bacteria
- Protists and Fungi
- Introduction to Plants
- Seed Plants

Human Biology and Health
- Bones, Muscles, and Skin
- Food and Digestion
- Circulation
- Respiratory and Excretion
- Fighting Disease
- The Nervous System
- The Endocrine System

Motion, Forces, and Energy
- Motion
- Forces
- Forces in Fluids
- Work and Machines
- Energy

- Thermal Energy and Heat

8th Grade

Environmental Science

- Populations and Communities
- Ecosystems and Biomes
- Living Resources
- Land, Water, and Air Resources
- Energy Resources

Chemical Interactions

- Atoms and Bonding
- Chemical Reactions
- Acids, Bases,and Solutions
- Carbon Chemistry

Astronomy

- Earth, Moon, and Sun
- Exploring Space
- The Solar System
- Stars, Galaxies, and the Universe

Weather and Climate

- The Atmosphere
- Weather Factors
- Weather Patterns
- Climate and Climate Change

Cross-curricular Connections/Standards:

Common Core State Standards Connections:

ELA/Literacy -

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. *(MS-PS2-1),(MS-PS2-3)*

RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or

performing technical tasks. *(MS-PS2-1),(MS-PS2-2),(MS-PS2-5)*

WHST.6-8.1 Write arguments focused on *discipline-specific content*. (MS-PS2-4)

WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. *(MS-PS2-1)*,(MS-PS2-2),*(MS-PS2-5)*

Mathematics -

MP.2 Reason abstractly and quantitatively. (MS-PS2-1),(MS-PS2-2),(MS-PS2-3)

6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real world contexts, explaining the meaning of 0 in each situation. (MS-PS2-1)

6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers. *(MS-PS2-1),(MS-PS2- 2)*

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form, using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *(MS-PS2-1),(MS-PS2-2)*

EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. *(MS- PS2-1),(MS-PS2-2)*

Technology
8.1.5.A.2
8.1.5.A.4
8.1.5.A.5

21st Century Life and Careers
9.2.8.B.1
CRP1
CRP2
7.

Eastampton Township School District
Curriculum Guide
Grade: 7,8
Content Area: Physical Science

Suggested Assessments:

- Tests & quizzes
- Current Science Assignments
- Classwork on various topics
- Homework Assignments
- Differentiated Projects
- Teacher observations
- Discussion/Class participation
- Lab Reports

Modifications for SpEd/ESL/Students at Risk/Gifted

Supports, Accommodations, and Modifications must be provided as stated in IEP, 504 Plan or I-Team Intervention Plan, and may include (but not limited to) the following:

Presentation accommodations:

- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Use alternate texts at lower readability level
- Work with fewer items per page or line and /or materials in a larger print size
- Use magnification device, screen reader, or Braille/Nemeth Code

· Use audio amplification device (e.g., hearing aide(s), auditory trainer, sound-field system(which may require teacher use of microphone) ·

Be given a written lists of instructions
· Record a lesson, instead of taking notes
· Have another student share class notes with him
· Be given an outline of lesson
· Be given a copy of teacher's lecture notes
· Be given a study guide to assist in preparing for assessments
· Use visual presentations of verbal material, such as word webs and visual organizers
· Use manipulatives to teach or demonstrate concepts
· Have curriculum materials translated into native language

Response accommodations:

· Use sign language, a communication device, Braille, other technology, or native language other than English ·
Dictate answers to a scribe

· Capture responses to an audio recorder
· Use a spelling dictionary or electronic spell-checker
· Use a word processor to type notes or give responses in class
· Use a calculator or table or "math facts"
· Respond directly in the test booklet rather than on an answer sheet.

Setting accommodations:

· Work or take a test in a different setting, such as quiet room with few distractions
· Sit where he learns best (for example, near the teacher, away from distractions)
· Use special lighting or acoustics
· Take a test in small group setting
· Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
· Use noise buffers such as headphones, earphones, or earplugs

Timing accommodations:

· Take more time to complete a task or a test
· Have extra time to process oral information and directions
· Take frequent breaks, such as after completing a task

Scheduling accommodations:

· Take more time to complete a project
· Take a test in several timed sessions or over several days
· Take sections of a test in a different order
· Take a test at a specific time of day

Organization skills accommodations:

· Use an alarm to help with time management
· Mark texts with a highlighter
· Have help coordinating assignments in a book or planner
· Receive study skills instruction

Assignment modifications:

· Complete fewer or different homework problems than peers
· Write shorter paper

· Answer fewer or different test questions

· Create alternate projects or assignments

Curriculum modifications:

· Get graded or assessed using a different standard than the one for classmates

Eastampton Township School District
Curriculum Guide
Grade: 8
Content Area: Life Science

MS-LS2 Ecosystems: Interactions, Energy, and Dynamics

NGSS:

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.
[Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
[Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
[Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.]

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
[Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*
[Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social

considerations.]

Big Ideas:

LS2.A: Interdependent Relationships in Ecosystems

- Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)
- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2- 1)
- Growth of organisms and population increases are limited by access to resources.(MS-LS2-1)

- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)

LS2.B: Cycle of Matter and Energy Transfer in Ecosystems

- Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.(MS-LS2-3)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical orbiological component of an ecosystem can lead to shifts in all its populations.(MS-LS2-4)
- Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5).

LS4.D: Biodiversity and Humans

- Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (secondary toMS-LS2-5)

ETS1.B: Developing Possible Solutions

- There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (secondary to MS-LS2-5)

Performance Expectations

	Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	

Eastampton Township School District
Curriculum Guide
Grade: 8
Content Area: Life Science

Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. *Develop a model to describe phenomena.* ***(MS-LS2-3)*** **Analyzing and Interpreting Data** Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. *Analyze and interpret data to provide evidence for phenomena.* ***(MS-LS2-1)*** **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include	**LS2.A: Interdependent Relationships in Ecosystems** ● Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1) ● In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2- 1) ● Growth of organisms and population increases are limited by access to resources. (MS LS2-1) ● Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS LS2-2) **LS2.B: Cycle of Matter and Energy Transfer in Ecosystems** ● Food webs are models that	**Patterns** *Patterns can be used to identify cause and effect relationships.* *(**MS LS2-2**)* **Cause and Effect** *Cause and effect relationships may be used to predict* *phenomena in natural or designed systems. (**MS LS2-1**)* **Energy and Matter** *The transfer of energy can be tracked as energy flows through a natural system. (**MSLS2-3**)* *Stability and Change Small changes in one part of a system might cause large changes in another part.* ***(MSLS2-4),(MS-LS2-5)*** **----------** **----------** **Connections to Engineering, Technology, and Applications of Science** **Influence of Science, Engineering, and Technology on Society and the Natural World** *The use of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the*

	constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.	demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups	*findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (**MS-LS2-5**)* **---** **----------** **---- Connections to Nature of Science** *Scientific Knowledge Assumes an Order and Consistency in Natural Systems Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS LS2-3)*	