MIDLAND PARK PUBLIC SCHOOLS
Midland Park, New Jersey
CURRICULUM

Science
Grade 7

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Approved by the Midland Park Board of Education on August 16, 2016

CCCS born on 9/2012
Revised 5/2013
NJSLS born on 9/2016

Grade 7 Science Curriculum Overview

Grade 7 science is taught in eight units throughout the school year. The science curriculum is a hands-on, open-ended and sequential process of investigating the biological and physical world. As part of the spiraling curriculum, aspects of physical science, life science, earth & space science, and engineering; technology & applications of science are taught throughout the year. A guided inquiry program gives students the opportunity to explore topics and concepts though investigations.

Participating in this hands-on program helps students:

1. To foster a lifelong enjoyment of learning science.
2. To observe science in the world around them.
3. To meet the science standards for New Jersey Public Schools.

Course Sequence:

Unit 1: Structure and Properties of Matter: 20 days
Unit 2: Interactions of Matter: 20 days
Unit 3: Chemical Reactions: 25 days
Unit 4: Structure and Function: 15 days
Unit 5: Body Systems: 15 days
Unit 6: Inheritance and Variation of Traits: 20 days
Unit 7: Organization for Matter and Energy Flow in Organisms: 15 days
Unit 8: Earth Systems: 30 days

Prerequisite: Grade 6 Science

Content Area: Science

Unit Title: Unit 1-Structure and Properties of Matter

Grade Level: 7

Unit Summary: Students build understandings of what occurs at the atomic and molecular scale. Students apply their understanding that pure substances have characteristic properties and are made from a single type of atom or molecule. They also provide a molecular level accounts to explain states of matter and changes between states. The crosscutting concepts of *cause and effect, scale, proportion and quantity, structure and function,interdependence of science, engineering, and technology,* and *the influence of science, engineering and technology on society and the natural world* provide a framework for understanding the disciplinary core ideas. Students demonstrate grade appropriate proficiency in *developing and using models*, and *obtaining, evaluating, and communicating information.* Students are also expected to use the scientific and engineering practices to demonstrate understanding of the core ideas.

Interdisciplinary Connections:

English Language Arts/Literacy

•Cite specific textual evidence to support analysis of science and technical texts on the characteristic properties of pure substances. Attend to precise details of explanations or descriptions about the properties of substances before and after they undergo a chemical process.

•Integrate qualitative information (flowcharts, diagrams, models, graphs, or tables) about the characteristic properties of substances before and after a chemical process has occurred with a version of that information expressed visually, *or* integrate technical information about the characteristic properties of substances before and after a chemical process has occurred with a version of that information expressed visually.

Mathematics

• Integrate quantitative or technical information about the composition of simple molecules and extended structures that is expressed in words in a text with a version of that information expressed in a model.

•Reason quantitatively (with amounts, numbers, sizes) and abstractly (with variables).

•Develop a mathematical model to describe the atomic composition of simple molecules and extended structures.

• Use ratio and rate reasoning to describe the atomic composition of simple molecules and extended structures.

•Reason quantitatively with amounts, numbers, and sizes for properties like density, melting point, boiling point, solubility, flammability, and odor, and reason abstractly by assigning labels or symbols.

•Use ratio and rate reasoning to determine whether a chemical reaction has occurred.

•Display numerical data for properties such as density, melting point, solubility, flammability, and order in plots on a number line, including dot plots, histograms, and box plots.

•Summarize numerical data sets on the properties of substances before and after the substances interact to determine whether a chemical reaction has occurred. The summary of the numerical data sets must be in relation to their context.

21st Century Themes and Skills:

CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP 4: Communicate clearly and effectively and with reason.
CRP8: Utilize critical thinking to make sense of problem.
CRP9: Model integrity, ethical leadership and effective management.

CRP11: Use technology to enhance productivity.

Standards (Content and Technology):

CPI#:	Statement:
MS-PS1-1	Develop models to describe the atomic composition of simple molecules and extended structures.
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.
Technology Standard 8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
Technology Standard 8.2.5.A.2	Investigate and present factors that influence the development and function of a product and a system.
Science and Engineering Practices	Developing and using models
Science and Engineering Practices	Analyzing and interpreting data
Crosscutting Concepts	Scale, Proportion, and Quantity
Crosscutting Concepts	Patterns

Unit Essential Question(s):

- How is it that everything is made of stardust?
- If the universe is not made of Legos®, then what is it made of?
- Is it possible to tell if two substances mixed or if they reacted with each other?

Unit Enduring Understandings:

- Substances are made from different types of atoms.
  - Atoms are the basic units of matter.
- Substances combine with one another in various ways.
  - Molecules are two or more atoms joined together.
- Atoms form molecules that range in size from two to thousands of atoms.
  - Molecules can be simple or very complex.
- Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals)
- Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.
- Substances react chemically in characteristic ways.
- In a chemical process, the atoms that make up the original substances are regrouped into different molecules; these new substances have different properties from those of the reactants.

	• The analysis of data on the properties of products and reactants can be used to determine whether a chemical process has occurred. • Density, melting point, boiling point, solubility, flammability, and odor are characteristic properties that can be used to identify a pure substance. • Macroscopic patterns are related to the nature of the atomic-level structure of a substance.

Unit Learning Targets/Objectives:

Students will

- Develop models to describe the atomic composition of simple molecules and extended structures.
- Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

Formative Assessments:

- Develop a model of a simple molecule.
- Use the model of the simple molecule to describe its atomic composition.
- Develop a model of an extended structure.
- Use the model of the extended structure to describe its repeating subunits

Summative/Benchmark Assessment:

- Analyze and interpret data to determine similarities and differences from results of chemical reactions between substances before and after they undergo a chemical process.
- Analyze and interpret data on the properties of substances before and after they undergo a chemical process.
- Identify and describe possible correlation and causation relationships evidenced in chemical reactions.
- Make logical and conceptual connections between evidence that chemical reactions have occurred and explanations of the properties of substances before and after they undergo a chemical process.

Resources/Materials (copy hyperlinks for digital resources):

Discoveryeducation.com - online textbook

http://scienceworld.scholastic.com/

NSTA Can You Copperplate?

NSTA Design and Build a Biosuit

http://calacademy.org/educators/lesson-plans/what-contains-carbon

http://calacademy.org/educators/lesson-plans/carbon-cycle-role-play

http://calacademy.org/educators/lesson-plans/carbon-cycle-poster

https://phet.colorado.edu/en/simulation/legacy/build-an-atom

https://phet.colorado.edu/en/simulation/legacy/hydrogen-atom

https://phet.colorado.edu/en/simulation/legacy/rutherford-scattering

http://www.middleschoolchemistry.com/lessonplans/chapter1

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

https://concord.org/stem-resources/states-matter

http://concord.org/stem-resources/molecular-view-gas

http://concord.org/stem-resources/molecular-view-liquid

http://concord.org/stem-resources/molecular-view-solid

https://www.brainpop.com/science/matterandchemistry/atoms/

https://www.brainpop.com/science/matterandchemistry/atomicmodel/
https://www.brainpop.com/science/matterandchemistry/crystals/
https://www.brainpop.com/science/earthsystem/salt/
NSTA Our class periodic table
NSTA The Octet Rules: A dating game for atoms
NSTA The Nature of Science-An Activity for the First Day of Class

Modifications:

- Special Education Students
  - Allow errors
  - Rephrase questions, directions, and explanations
  - Allow extended time to answer questions and permit drawing as an explanation
  - Accept participation on any level, even one word
  - Consult with Case Managers and follow IEP accommodations/modifications
- English Language Learners
  - Assign a buddy, same language or English speaking
  - Allow errors in speaking
  - Rephrase questions, directions, and explanations
  - Allow extended time to answer questions
  - Accept participation at any level, even one work
- At-Risk Students
  - Provide extended time to complete tasks
  - Consult with Guidance Counselors and follow I&RS procedures/action plans
  - Consult with other members of the 7th grade team for specific behavior interventions
  - Provide rewards as necessary
- Gifted and Talented Students
  - Provide extension activities
  - Build on students' intrinsic motivation
  - Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire Unit: 20 days
1	Atomic Models	10 days
2	Chemical Reactions	10 days

Teacher Notes:

Additional Resources
Click links below to access additional resources used to design this unit:
http://www.state.nj.us/education/modelcurriculum/sci/7u2.shtml
NSTA Translating the NGSS for Classroom Instruction

Content Area: Science

Unit Title: Unit 2- Interactions of Matter

Grade Level: 7

Unit Summary: Students build understandings of what occurs at the atomic and molecular scale. Students apply their understanding that pure substances have characteristic properties and are made from a single type of atom or molecule. They also provide a molecular level accounts to explain states of matter and changes between states. The crosscutting concepts of *cause and effect, scale, proportion and quantity, structure and function, interdependence of science, engineering, and technology,* and *the influence of science, engineering and technology on society and the natural world* provide a framework for understanding the disciplinary core ideas. Students demonstrate grade appropriate proficiency in *developing and using models,* and *obtaining, evaluating, and communicating information.* Students are also expected to use the scientific and engineering practices to demonstrate understanding of the core ideas.

Interdisciplinary Connections:

English Language Arts/Literacy

- Cite specific text to support the analysis of evidence that synthetic materials formed from natural resources affect society. Attend to the precise details of explanations or descriptions.
- Gather relevant information from multiple print and digital sources about the impact on society of synthetic materials that are formed from natural resources. Use search terms effectively, assess the credibility and accuracy of each source, and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

Mathematics

• Integrate quantitative information about changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed that is expressed in words with a version of that information that is expressed visually.

• Understand that positive and negative numbers are used together to describe quantities having opposite directions or values. Use positive and negative numbers to represent changes in particle motion and temperature when thermal energy is added or removed, explaining the meaning of zero in each situation.

21st Century Themes and Skills:

CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP4: Communicate clearly and effectively,and with reason.
CRP7: Employ valid and reliable research strategies.
CRP9: Model integrity, ethical leadership and effective management.
CRP11: Use technology to enhance productivity.

Standards (Content and Technology):

CPI#:	Statement:
MS-PS1-3	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
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.
Technology Standard	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.

8.1.8 D.1	
Technology Standard 8.1.8.D.2	Demonstrate the application of appropriate citations to digital content.
Technology Standard 8.1.8.D.4	Assess the credibility and accuracy of digital content.
Technology Standard 8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
Technology Standard 8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smartphone for mobility needs).
Science and Engineering Practices	Obtaining, Evaluating and Communicating Information
Science and Engineering Practices	Developing and Using Models
Crosscutting Concepts	Structure and Function
Crosscutting Concepts	Cause and Effect

Unit Essential Question(s): • How can you tell what the molecules are doing in a substance? • How can we trace synthetic materials back to natural ingredients?	**Unit Enduring Understandings:** • Changes in particle motion, temperature, and state of a pure substance occur when thermal energy is added or removed. • Qualitative molecular-level models of solids, liquids, and gases can be used to show that adding or removing thermal energy increases or decreases the kinetic energy of the particles until a change of state occurs. • Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. • In a liquid, the molecules are constantly in contact with others. • In a gas, the molecules 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. • The changes of state that occur with variations in temperature or pressure can be described and predicted using models of matter.

	• The term heat as used in everyday language refers both to thermal energy and the transfer of that thermal energy from one object to another. • Thermal energy is the motion of atoms or molecules within a substance. • In science, heat is used to refer to the energy transferred due to the temperature difference between two objects. • 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 the relationship between the average internal kinetic energy and the potential energy per atom or molecule depend on the type of atom or molecule and the 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. • Cause-and-effect relationships may be used to predict and describe changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed in natural systems. • Each pure substance has characteristic physical and chemical properties that can be used to identify it. • Substances react chemically in characteristic ways. • In a chemical process, the atoms that make up the original substances are regrouped into different molecules. • New substances that result from chemical processes have different properties from those of the reactants. • Natural resources can undergo a chemical process to form synthetic material. • Structures can be designed to serve particular functions by taking into account properties of different materials and how materials can be shaped and used. • Engineering advances have led to discoveries of important synthetic materials, and scientific

	discoveries have led to the development of entire industries and engineered systems using these materials. • Technology use varies from region to region and over time. • The uses of technologies (engineered/synthetic materials) and any limitations on their use are driven by individual or societal needs, desires, and values. • The uses of technologies (engineered/synthetic materials) and any limitations on their use are driven by the findings of scientific research and by differences in such factors as climate, natural resources, and economic conditions.

Unit Learning Targets/Objectives:

Students will

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

Formative Assessments:

• Use cause-and-effect relationships to predict changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed in natural or designed systems.

• Obtain, evaluate, and communicate information to show that synthetic materials come from natural resources and affect society.

•Gather, read, and synthesize information about how synthetic materials formed from natural resources affect society.

•Assess the credibility, accuracy, and possible bias of each publication and methods used within the publication.

Summative/Benchmark Assessment:

•Develop a model that predicts and describes changes in particle motion that could include molecules or inert atoms or pure substances.

•Describe how information about how synthetic materials formed from natural resources affect society is supported or not supported by evidence.

Resources/Materials (copy hyperlinks for digital resources):

Discoveryeducation.com - online textbook
http://scienceworld.scholastic.com/
http://www.middleschoolchemistry.com/lessonplans/chapter1
http://www.middleschoolchemistry.com/lessonplans/chapter2
https://concord.org/stem-resources/states-matter
http://concord.org/stem-resources/molecular-view-gas
http://concord.org/stem-resources/molecular-view-liquid

http://concord.org/stem-resources/molecular-view-solid
https://www.brainpop.com/science/matterandchemistry/compoundsandmixtures/
https://www.brainpop.com/science/matterandchemistry/matterchangingstates/
https://www.brainpop.com/science/matterandchemistry/statesofmatter/
https://www.brainpop.com/science/matterandchemistry/temperature/
https://www.brainpop.com/science/energy/biofuels/
https://www.brainpop.com/science/earthsystem/oceanfloor/
http://calacademy.org/educators/lesson-plans/fossil-fuels-air-pollution-and-the-greenhouse-effect
http://calacademy.org/educators/lesson-plans/fossil-fuels-chocolate-chip-mining
http://calacademy.org/educators/lesson-plans/natural-resources-bingo
http://calacademy.org/educators/lesson-plans/slippery-shores-oil-spill-clean-up
NSTA An exploration of the physical nature of gases
NSTA Lavoisier Measures with Polymers
NSTA Smelling the chocolate: The perks of modeling habits of mind
NSTA Conservation of mass and an unsuspected buoyancy effect

Modifications:

- Special Education Students
  - Allow errors
  - Rephrase questions, directions, and explanations
  - Allow extended time to answer questions and permit drawing as an explanation
  - Accept participation on any level, even one word
  - Consult with Case Managers and follow IEP accommodations/modifications
- English Language Learners
  - Assign a buddy, same language or English speaking
  - Allow errors in speaking
  - Rephrase questions, directions, and explanations
  - Allow extended time to answer questions
  - Accept participation at any level, even one work
- At-Risk Students
  - Provide extended time to complete tasks
  - Consult with Guidance Counselors and follow I&RS procedures/action plans
  - Consult with other members of the 7th grade team for specific behavior interventions
  - Provide rewards as necessary
- Gifted and Talented Students
  - Provide extension activities
  - Build on students' intrinsic motivation
  - Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire Unit: 20 days
1	States of Matter Model	5 days
2	Synthetic Alternatives	15 days

Teacher Notes:

Additional Resources
Click links below to access additional resources used to design this unit:
http://www.state.nj.us/education/modelcurriculum/sci/7u2.shtml

NSTA Translating the NGSS for Classroom Instruction

Content Area: Science

Unit Title: Unit 3-Chemical Reactions

Grade Level: 7

Unit Summary: Students provide molecular-level accounts of states of matters and changes between states, of how chemical reactions involve regrouping of atoms to form new substances, and how of how atoms rearrange during chemical reactions. Students also apply their understanding of optimization design and process in engineering to chemical reaction systems. The crosscutting concept of *energy and matter* provides a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency

Interdisciplinary Connections:

English Language Arts

- Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks *related to chemical reactions that release energy and some that store energy.*
- Cite specific textual evidence to support analysis of science and technical texts on the design and modification of a device that controls the transfer of energy to the environment using factors such as type and concentration of a substance.
- Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text *on the design and modification of a device that controls the transfer of energy to the environment using factors such as type and concentration of a substance.*
- Conduct research on the design and modification of a device that controls the transfer of energy to the environment using factors such as type and concentration of a substance 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.
- Draw evidence from informational texts to support analysis, reflection, and research on the design and modification of a device that controls the transfer of energy to the environment using factors such as type and concentration of a substance.
- Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points *on the design and modification of a device that controls the transfer of energy to the environment.*

Mathematics

- Integrate quantitative information expressed in words about atoms before and after a chemical process with a version of that information expressed in a physical model or drawing, including digital forms.
- Reason quantitatively and abstractly during communication about melting or boiling points.
- Use mathematics to model the law of conservation of matter.
- Use ratio and rate reasoning to describe how the total number of atoms does not change in a chemical reaction, and thus mass is conserved.
- Reason quantitatively and abstractly: Reason quantitatively using numbers to represent the criteria (amount, time, and temperature of substance) when testing a device that either releases or absorbs thermal energy by chemical processes; reason abstractly by assigning labels or symbols.
- Collect and analyze numerical data from tests of a device that either releases or absorbs thermal energy by chemical processes. 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. Pose problems with positive and negative rational numbers in any form, using tools strategically. Apply properties of operations to calculate the numerical data with numbers in any form, convert between forms as appropriate, and assess the reasonableness of answers using mental computations and estimation strategies.
- Develop a probability model and use it as part of an iterative process for testing to find the probability that a promising design solution will lead to an optimal solution. Compare probabilities from a model to observed

frequencies; if the agreement is not good, explain possible sources of the discrepancy in order to ultimately develop an optimal design.

21st Century
Themes and Skills:
CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP4: Communicate clearly and effectively and with reason.
CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Standards (Content and Technology):

CPI#:	Statement:
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.
MS-PS1-6	Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
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.
Technology Standard 8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results.
Technology Standard 8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.
Technology Standard 8.2.8.C.5	Explain the interdependence of a subsystem that operates as part of a system. Create a technical sketch of a product with materials and measurements labeled.
Technology Standard 8.2.8 C.6	Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
Technology Standard 8.2.8 C.7	Collaborate with peers and experts in the field to research and develop a product using the design process, data analysis and trends, and maintain a design log with annotated sketches to record the developmental cycle.
Technology Standard 8.2.8 C.8	Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
Technology Standard 8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
Technology Standard 8.2.8.D.2	Identify the design constraints and tradeoffs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.

Technology Standard 8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
Science and Engineering Practices	Developing and Using Models
Science and Engineering Practices	Constructing Explanations and Designing Solutions
Science and Engineering Practices	Analyzing and Interpreting Data
Crosscutting Concepts	Energy and Matter

Unit Essential Question(s):

- How do substances combine or change (react) to make new substances?
- What happens to the atoms when I bake a cake?
- How can a device be designed, constructed, tested, and modified that either releases or absorbs thermal energy by chemical processes?

Unit Enduring Understandings:

- Substances react chemically in characteristic ways.
- In a chemical process, the atoms that make up the original substances are regrouped into different molecules.
- New substances created in a chemical process have different properties from those of the reactants.
- The total number of each type of atom in a chemical process is conserved, and thus the mass does not change (the law of conservation of matter).
- Matter is conserved because atoms are conserved in physical and chemical processes.
- The law of conservation of mass is a mathematical description of natural phenomena.
- Substances react chemically in characteristic ways.
- In a chemical process, the atoms that make up the original substances are regrouped into different molecules.
- New substances created in a chemical process have different properties from those of the reactants.
- The total number of each type of atom in a chemical process is conserved, and thus the mass does not change (the law of conservation of matter).
- Matter is conserved because atoms are conserved in physical and chemical processes.
- The law of conservation of mass is a mathematical description of natural phenomena.Some chemical reactions release energy, while others store energy.

	• The transfer of thermal energy can be tracked as energy flows through a designed or natural system. • Models of all kinds are important for testing solutions. • There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. • 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. • A solution needs to be tested and then modified on the basis of the test results in order to for it to be improved. • 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. • Some of the characteristics identified as having the best performance may be incorporated into the new design.

Unit Learning Targets/Objectives:

Students will

- 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.
- Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
- 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.

Formative Assessments:

•Use physical models or drawings, including digital forms, to represent atoms in a chemical process.

•Use mathematical descriptions to show that the number of atoms before and after a chemical process is the same.

•Specific criteria are limited to amount, time, and temperature of a substance.

Summative/Benchmark Assessment:

•Undertake a design project, engaging in the design cycle, to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

•Develop a model to generate data for testing a device that either releases or absorbs thermal energy by chemical processes, including those representing inputs and outputs of thermal energy.

•Track the transfer of thermal energy as energy flows through a designed system that either releases or absorbs thermal energy by chemical processes.

•Analyze and interpret data for the amount, time, and temperature of a substance in testing a device that either releases or absorbs thermal energy by chemical processes to determine similarities and differences in findings.

Resources/Materials (copy hyperlinks for digital resources):
Discoveryeducation.com - online textbook
http://scienceworld.scholastic.com/
http://www.middleschoolchemistry.com/lessonplans/chapter4
http://www.middleschoolchemistry.com/lessonplans/chapter5
http://www.middleschoolchemistry.com/lessonplans/chapter6
http://www.westperry.org/cms/lib/PA09000117/Centricity/Domain/560/Gumdrop%20lab.pdf
https://www.teachengineering.org/activities/view/cub_mix_lesson1_activity1
http://www.myips.org/cms/lib8/IN01906626/Centricity/Domain/8123/atomic%20structure%20and%20periodic%20table.pdf
https://www.brainpop.com/science/matterandchemistry/propertychanges/
https://www.brainpop.com/science/matterandchemistry/conservationofmass/
https://www.brainpop.com/science/matterandchemistry/compoundsandmixtures/
https://www.brainpop.com/science/matterandchemistry/chemicalequations/
NSTA Using Easy Bake Ovens to Teach Chemistry
NSTA The Halloween lab
Minnesota Science Teachers' Education Project-Investigate Chemical Changes - What are some signs of chemical change?

Modifications:

- Special Education Students
  - Allow errors
  - Rephrase questions, directions, and explanations
  - Allow extended time to answer questions and permit drawing as an explanation
  - Accept participation on any level, even one word
  - Consult with Case Managers and follow IEP accommodations/modifications
- English Language Learners
  - Assign a buddy, same language or English speaking
  - Allow errors in speaking
  - Rephrase questions, directions, and explanations
  - Allow extended time to answer questions
  - Accept participation at any level, even one work
- At-Risk Students
  - Provide extended time to complete tasks
  - Consult with Guidance Counselors and follow I&RS procedures/action plans
  - Consult with other members of the 7th grade team for specific behavior interventions
  - Provide rewards as necessary
- Gifted and Talented Students
  - Provide extension activities
  - Build on students' intrinsic motivation
  - Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire Unit: 25 days
1	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.	5 days
2	Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	10 days
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.	10 days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

http://www.state.nj.us/education/modelcurriculum/sci/7u2.shtml

NSTA Translating the NGSS for Classroom Instruction

Content Area: Science

Unit Title: Unit 4-Structure and Function

Grade Level: 7

Unit Summary: Students demonstrate age appropriate abilities to plan and carry out investigations to develop *evidence* that living organisms are made of cells. Students gather information to support explanations of the relationship between structure and function in cells. They are able to communicate an understanding of cell theory and understand that all organisms are made of cells. Students understand that special structures are responsible for particular functions in organisms. They then are able to use their understanding of cell theory to develop and use physical and conceptual models of cells. The crosscutting concepts of *scale, proportion, and quantity* and *structure and function* provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in *planning and carrying out investigations*, *analyzing and interpreting data*, and *developing and using models*, Students are also expected to use these to use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

Interdisciplinary Connections:
English Language Arts

- Conduct a short research project collecting evidence that living things are made of cells to answer a question (including a self-generated question). Draw on several sources and generate additional related, focused questions that allow for multiple avenues of exploration.

- Integrate multimedia and visual displays of cells and specific cell parts into presentations to clarify information, strengthen claims and evidence, and add interest.

Mathematics

- Use variables to represent two quantities, such as the number of cells that makes up an organism and units representing the size or type of the organism, and determine the relationship between these two variables.

- 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.

- Use variables to represent two quantities in a real-world problem that change in relationship to one another—for example, determining the ratio of a cell's surface area to its volume. 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.

21st Century
Themes and Skills:
CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP4: Communicate clearly and effectively and with reason.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP9: Model integrity, ethical leadership and effective management.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Standards (Content and Technology):	
CPI#:	**Statement:**
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.
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.
Technology Standard 8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
Technology Standard 8.1.8.D.2	Demonstrate the application of appropriate citations to digital content.
Technology Standard 8.1.8.D.4	Assess the credibility and accuracy of digital content.
Technology Standard 8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
Science and Engineering Practices	Planning and Carrying Out Investigations
Science and Engineering Practices	Developing and Using Models
Crosscutting Concepts	Scale, Proportion, and Quantity
Crosscutting Concepts	Structure and Function

Unit Essential Question(s):	**Unit Enduring Understandings:**
• How do cells contribute to the functioning of an organism? • How will astrobiologists know if they have found life elsewhere in the solar system? • How do the functions of cells support an entire organism?	• Distinguish between living and nonliving things. • Cells are the smallest unit of life that can be said to be alive. • All living things are made up of cells, either one cell or many different numbers and types of cells. • Organisms may consist of one single cell (unicellular). • Nonliving things can be composed of cells. • Organisms may consist of many different numbers and types of cells (multicellular). • Cells that can be observed at one scale may not be observable at another scale. • Engineering advances have led to important discoveries in the field of cell biology, and scientific

discoveries have led to the development of entire industries and engineered systems.

- The cell functions as a whole system.
- Identify parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.
- Within cells, special structures are responsible for particular functions.
- Within cells, the cell membrane forms the boundary that controls what enters and leaves the cell.
- Complex and microscopic structures and systems in cells can be visualized, modeled, and used to describe how the function of the cell depends on the relationships among its parts.
- Complex natural structures/systems can be analyzed to determine how they function.
- A model can be used to describe the function of a cell as a whole.
- A model can be used to describe how parts of cells contribute to the cell's function.
- The structures of the cell wall and cell membrane are related to their function.

Unit Learning Targets/Objectives:

Students will

- Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
- Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

Formative Assessments:

•Conduct an investigation to produce data that provides evidence distinguishing between living and nonliving things.

•Conduct an investigation to produce data supporting the concept that living things may be made of one cell or many and varied cells.

•Distinguish between living and nonliving things.

•Observe different types of cells that can be found in the makeup of living things.

•Develop and use a model to describe how parts of cells contribute to the cell's function.

•Develop and use models to describe the relationship between the structure and function of the cell wall and cell membrane.

Summative/Benchmark Assessment:

•Develop and use a model to describe the function of a cell as a whole.

Resources/Materials (copy hyperlinks for digital resources):

Discoveryeducation.com - online textbook
http://scienceworld.scholastic.com/
NSTA Let's Talk Science: Seeding Argumentation About Cells and Growth
NSTA Movement of Molecules Into Or Out of Cells
NSTA Reproduction
NSTA Effect of the Environment on Plant Growth
NSTA Lab 4: Cell Structure from "Argument Driven Inquiry in Life Science"
https://www.brainpop.com/science/cellularlifeandgenetics/stemcells/
https://www.brainpop.com/science/cellularlifeandgenetics/cells/
https://www.brainpop.com/science/cellularlifeandgenetics/cellspecialization/
NSTA Cell City Mystery Game

Modifications:

- Special Education Students
  - Allow errors
  - Rephrase questions, directions, and explanations
  - Allow extended time to answer questions and permit drawing as an explanation
  - Accept participation on any level, even one word
  - Consult with Case Managers and follow IEP accommodations/modifications
- English Language Learners
  - Assign a buddy, same language or English speaking
  - Allow errors in speaking
- At-Risk Students
  - Provide extended time to complete tasks
  - Consult with Guidance Counselors and follow I&RS procedures/action plans
  - Consult with other members of the 7th grade team for specific behavior interventions
  - Provide rewards as necessary
- Gifted and Talented Students
  - Provide extension activities
  - Build on students' intrinsic motivation
  - Consult with parents to accommodate students' interests in completing tasks at their level of engagement

- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one work

Lesson Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire unit: 15 days
1	Cell Investigation	8 days
2	Cell Model	7 days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

http://www.state.nj.us/education/modelcurriculum/sci/7u2.shtml

NSTA Translating the NGSS for Classroom Instruction

Content Area: Science

Unit Title: Unit 5-Body Systems

Grade Level: 7

Unit Summary: Students develop a basic understanding of the role of cells in body systems and how those systems work to support the life functions of the organism. Students will construct explanations for the interactions of systems in cells and organisms. Students understand that special structures are responsible for particular functions in organisms, and that for many organisms, the body is a system of multiple-interacting subsystems that form a hierarchy, from cells to the body. Students construct explanations for the interactions of systems in cells and organisms and for how organisms gather and use information from the environment. The crosscutting concepts of *systems and system models* and *cause and effect* provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in *engaging in argument from evidence* and *obtaining, evaluating, and communicating information*. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

Interdisciplinary Connections:

English Language Arts

- Cite specific textual evidence to support analysis of science and technical texts that provide evidence for how the body is a system of interacting subsystems composed of cells.

- Trace and evaluate a text's argument that the body is a system of interacting subsystems composed of cells, distinguishing claims that are supported by reasons and evidence from claims that are not.

- Write arguments, supported by evidence, for how the body is a system of interacting subsystems composed of groups of cells.

- Gather relevant information concerning how sensory receptors function by responding to stimuli, then sending messages to the brain, which responds immediately through some form or behavior or by storing the messages as memory.

- Quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.

Mathematics

N/A

21st Century Themes and Skills:

CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP4: Communicate clearly and effectively and with reason.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere
CRP9: Model integrity, ethical leadership and effective management.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Standards (Content and Technology):	
CPI#:	**Statement:**
MS-LS1-3	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
MS LS1-8	Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
Technology Standard 8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
Technology Standard 8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
Technology Standard 8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
Technology Standard 8.1.8.D.2	Demonstrate the application of appropriate citations to digital content.
Technology Standard 8.1.8.D.4	Assess the credibility and accuracy of digital content.
Technology Standard 8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
Science and Engineering Practices	Obtaining, Evaluating, and Communicating Information
Science and Engineering Practices	Engaging in Argument from Evidence
Crosscutting Concepts	Systems and System Models
Crosscutting Concepts	Cause and Effect

Unit Essential Question(s):	**Unit Enduring Understandings:**
• What are humans made of? • What is the evidence that a body is actually a system of interacting subsystems composed of groups of interacting cells? • How do organisms receive and respond to information from their environment?	• In multicellular organisms, the body is a system of multiple, interacting subsystems. • Subsystems are groups of cells that work together to form tissues. • Organs are groups of tissues that work together to perform a particular body function. • Tissues and organs are specialized for particular body functions. • Systems may interact with other systems. • Systems may have subsystems and be part of larger complex systems.

	• Interactions are limited to the circulatory, excretory, digestive, respiratory, muscular, and nervous systems. • Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. • Sense receptors respond to different inputs (electromagnetic, mechanical, chemical). • Sense receptors transmit responses as signals that travel along nerve cells to the brain. • Signals are then processed in the brain. • Brain processing results in immediate behaviors or memories. • Cause-and-effect relationships may be used to predict response to stimuli in natural systems.

Unit Learning Targets/Objectives:

Students will

- Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
- Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Formative Assessments:

• Gather, read, and synthesize information from multiple appropriate sources about sensory receptors' responses to stimuli.

• Assess the credibility, accuracy, and possible bias of each publication and methods used.

•Describe how publications and methods used are supported or not supported by evidence.

Summative/Benchmark Assessments:

•Use an oral and written argument supported by evidence to support or refute an explanation or a model of how the body is a system of interacting subsystems composed of groups of cells.

Resources/Materials (copy hyperlinks for digital resources):

Discoveryeducation.com - online textbook
http://scienceworld.scholastic.com/
NSTA No Ordinary Coronary
NOVA body + brain
Animal Communications
Vote for your favorite smart animal
Mind Controlled Bionic Arm - Teacher Video
Nova Science Now: What Are Animals Thinking? Decision-making Bees and the Human Brain
https://www.brainpop.com/science/cellularlifeandgenetics/stemcells/

https://www.brainpop.com/science/ecologyandbehavior/metamorphosis/
https://www.brainpop.com/science/cellularlifeandgenetics/cells/
https://www.brainpop.com/science/cellularlifeandgenetics/cellspecialization/
https://www.brainpop.com/health/bodysystems/humanbody/

Modifications:

- Special Education Students
  - Allow errors
  - Rephrase questions, directions, and explanations
  - Allow extended time to answer questions and permit drawing as an explanation
  - Accept participation on any level, even one word
  - Consult with Case Managers and follow IEP accommodations/modifications
- English Language Learners
  - Assign a buddy, same language or English speaking
  - Allow errors in speaking
  - Rephrase questions, directions, and explanations
  - Allow extended time to answer questions
  - Accept participation at any level, even one work
- At-Risk Students
  - Provide extended time to complete tasks
  - Consult with Guidance Counselors and follow I&RS procedures/action plans
  - Consult with other members of the 7th grade team for specific behavior interventions
  - Provide rewards as necessary
- Gifted and Talented Students
  - Provide extension activities
  - Build on students' intrinsic motivation
  - Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire Unit: 15 days
1	Body Systems Project	10 days
2	Sensory Receptor Project	5 days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:
http://www.state.nj.us/education/modelcurriculum/sci/7u2.shtml
NJ DOE Science grade 7 Unit 5: Body Systems
NSTA Translating the NGSS for Classroom Instruction

Content Area: Science

Unit Title: Unit 6- Inheritance and Variation of Traits

Grade Level: 7

Unit Summary: Students develop and use models to describe how gene mutations and sexual reproduction contribute to genetic variation. Students understand how genetic factors determine the growth of an individual organism. They also demonstrate understanding of the genetic implications of sexual and asexual reproduction. The crosscutting concepts of *cause and effect* and *structure and function* provide a framework for understanding how gene structure determines differences in the functioning of organisms. Students are expected to demonstrate proficiency in *developing and using models*. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

Interdisciplinary Connections:

English Language Arts

•Cite specific textual evidence to support analysis of science and technical texts about structural changes to genes (mutations) located on chromosomes that may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

•Determine the meaning of symbols, key terms, and other domain-specific phrases as they are used to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

•Integrate quantitative or technical information about why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism that is expressed in words with a version of that information expressed visually in a flowchart, diagram, model, graph, or table.

• Include multimedia components and visual displays in presentations about structural changes to genes (mutations) located on chromosomes that may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism to clarify claims and findings and emphasize salient points.

•Cite specific textual evidence for why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation to support analysis of science and technical texts.

•Determine the meaning of symbols, key terms, and other domain-specific phrases as they are used to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

•Integrate quantitative or technical information that describes why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation that is expressed in words with a version of that information that is expressed visually in a flowchart, diagram, model, graph, or table.

•Include multimedia components and visual displays in presentations that describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation to clarify claims and findings and emphasize salient points.

Mathematics

•Use mathematics to model why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

•Summarize numerical data sets that describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation in relation to their context.

21st Century Themes and Skills:

CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP4: Communicate clearly and effectively and with reason.
CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective management.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Standards (Content and Technology):

CPI#:	Statement:
MS-LS3-1	Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
MS-LS3-2	Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
Technology Standard 8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
Technology Standard 8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
Technology Standard 8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
Science and Engineering Practices	Developing and Using Models
Crosscutting Concepts	Structure and Function
Crosscutting Concepts	Cause and Effect

Unit Essential Question(s):

- Why do kids look similar to their parents?
- How do structural changes to genes (mutations) located on chromosomes affect proteins or affect the structure and function of an organism?
- How do asexual reproduction and sexual reproduction affect the genetic variation of offspring?

Unit Enduring Understandings:

- Complex and microscopic structures and systems, such as genes located on chromosomes, can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among the parts of the system; therefore, complex natural structures/systems can be analyzed to determine how they function.
- Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes.
- Each distinct gene chiefly controls the production of specific proteins, which in turn affect the traits of the individual.

	• In addition to variations that arise from sexual reproduction, genetic information can be altered due to mutations. • Some changes to genetic material are beneficial, others harmful, and some neutral to the organism. • Changes in genetic material may result in the production of different proteins. • Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. • Structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism • Though rare, mutations may result in changes to the structure and function of proteins. • Organisms reproduce either sexually or asexually and transfer their genetic information to their offspring. • Asexual reproduction results in offspring with identical genetic information. • Sexual reproduction results in offspring with genetic variation. • Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. • In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. • Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. • Punnett squares, diagrams, and simulations can be used to describe the cause-and-effect relationship of gene transmission from parent to offspring and resulting genetic variation.	
Unit Learning Targets/Objectives: *Students will* • Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.		

- Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

Formative Assessments:

•Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

•Use models such as Punnett squares, diagrams, and simulations to describe the cause-and effect-relationship of gene transmission from parent(s) to offspring and resulting genetic variation.

Summative/Benchmark Assessment:

•Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information.

•Develop and use a model to describe why sexual reproduction results in offspring with genetic variation.

Resources/Materials (copy hyperlinks for digital resources):

Discoveryeducation.com - online textbook
http://scienceworld.scholastic.com/
NSTA Meiosis: How Does the Process of Meiosis Reduce the Number of Chromosomes in Reproductive Cells?
NSTA Pedigrees and the Inheritance of Lactose Intolerance
NSTA Junior's Family Tree
NSTA Monstrous Mutations Adaptation: Mutations & Variations Activity
NSTA A Recipe for Traits
http://www.hhmi.org/biointeractive/pedigrees-and-inheritance-lactose-intolerance
http://www.calacademy.org/educators/lesson-plans/color-vision-genetics
http://www.calacademy.org/educators/lesson-plans/invent-an-insect
http://www.calacademy.org/educators/lesson-plans/observing-variation
http://www.calacademy.org/educators/lesson-plans/flowers-seeking-pollinators
https://www.brainpop.com/science/cellularlifeandgenetics/asexualreproduction/
https://www.brainpop.com/science/cellularlifeandgenetics/cloning/
https://www.brainpop.com/science/cellularlifeandgenetics/dna/
https://www.brainpop.com/science/diversityoflife/dollythesheep/
https://www.brainpop.com/science/cellularlifeandgenetics/geneticmutations/
https://www.brainpop.com/science/cellularlifeandgenetics/genetics/
https://www.brainpop.com/science/cellularlifeandgenetics/heredity/

Modifications:

- Special Education Students
  - Allow errors
  - Rephrase questions, directions, and explanations
  - Allow extended time to answer questions and permit drawing as an explanation
  - Accept participation on any level, even one word
  - Consult with Case Managers and follow IEP accommodations/modifications
- At-Risk Students
  - Provide extended time to complete tasks
  - Consult with Guidance Counselors and follow I&RS procedures/action plans
  - Consult with other members of the 7th grade team for specific behavior interventions
  - Provide rewards as necessary
- Gifted and Talented Students
  - Provide extension activities

- English Language Learners
  - Assign a buddy, same language or English speaking
  - Allow errors in speaking
  - Rephrase questions, directions, and explanations
  - Allow extended time to answer questions
  - Accept participation at any level, even one work
  - Build on students' intrinsic motivation
  - Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Topic	Lesson Objective(s)	Time frame (days to complete) Entire Unit: 20 days	
1	Asexual Reproduction Model	10 days	
2	Sexual Reproduction Model	10 days	

Teacher Notes:

Additional Resources
Click links below to access additional resources used to design this unit:
http://www.state.nj.us/education/modelcurriculum/sci/7u2.shtml
Investigating Reproductive Strategies
NSTA Translating the NGSS for Classroom Instruction

Content Area: Science

Unit Title: Unit 7-Organization for Matter and Energy Flow in Organisms

Grade Level: 7

Unit Summary: Students provide a mechanistic account for how cells provide a structure for the plant process of photosynthesis in the movement of matter and energy needed for the cell. Students use conceptual and physical models to explain the transfer of energy and cycling of matter as they construct explanations for the role of photosynthesis in cycling matter in ecosystems. They construct scientific explanations for the cycling of matter in organisms and the interactions of organisms to obtain matter and energy from an ecosystem to survive and grow. They understand that sustaining life requires substantial energy and matter inputs, and that the structure and functions of organisms contribute to the capture, transformation, transport, release, and elimination of matter and energy. The crosscutting concepts of matter and energy and structure and function provide a framework for understanding of the cycling of matter and energy flow into and out of organisms. Students are also expected to demonstrate proficiency in developing and using models. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

Interdisciplinary Connections:

English Language Arts

- Cite specific textual evidence to support analysis of science and technical texts about the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
- Determine the central ideas about the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinion.
- Write informative/explanatory texts to examine the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms, and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
- Draw evidence from informational texts to support analysis, reflection, and research about the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
- Integrate multimedia and visual displays into presentations about how food is rearranged through chemical reactions to form new molecules that support growth and/or release energy as the matter moves through an organism to clarify information, strengthen claims and evidence, and add interest.

Mathematics

- Use variables to represent two quantities involved in the process whereby photosynthesis plays a part in the cycling of matter and energy into and out of organisms. 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.

21st Century Themes and Skills:

CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP4: Communicate clearly and effectively and with reason.
CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective management.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Standards (Content and Technology):	
CPI#:	**Statement:**
MS-LS1-6	Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
MS-LS2-7	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.
Technology Standard 8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
Technology Standard 8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
Technology Standard 8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
Technology Standard 8.1.8.D.2	Demonstrate the application of appropriate citations to digital content.
Technology Standard 8.1.8.D.4	Assess the credibility and accuracy of digital content.
Technology Standard 8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
Science and Engineering Practices	Constructing Explanations and Designing Solutions
Science and Engineering Practices	Developing and Using Models
Crosscutting Concepts	Energy and Matter

Unit Essential Question(s):	**Unit Enduring Understandings:**
• How do some organisms turn electromagnetic radiation into matter and energy? • What is the role of photosynthesis in the cycling of matter and flow of energy into and out of an organism?	• Photosynthesis has a role in the cycling of matter and flow of energy into and out of organisms. • The flow of energy and cycling of matter can be traced. • 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.

• How is food rearranged through chemical reactions to form new molecules that support growth and/or release energy as this matter moves through an organism?	• 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, which also releases oxygen. • Sugars produced by plants can be used immediately or stored for growth or later use. • Within a natural system, the transfer of energy drives the motion and/or cycling of matter. • Food is rearranged through chemical reactions, forming new molecules that support growth. • Food is rearranged through chemical reactions, forming new molecules that release energy as this matter moves through an organism. • Molecules are broken apart and put back together to form new substances, and in this process, energy is released. • Cellular respiration in plants and animals involves chemical reactions with oxygen that release stored energy. Students who understand the concepts are able to: • Develop and use a model to describe how food is rearranged through chemical reactions. • In cellular respiration, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. • 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. • Matter is conserved during cellular respiration because atoms are conserved in physical and chemical processes.

Unit Learning Targets/Objectives:

Students will

- 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.

- 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.

Formative Assessments:

Summative/Benchmark Assessments:

- Construct a scientific explanation for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms based on valid and reliable evidence obtained from sources (including the students' own experiments).

- Construct a scientific explanation for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms based on 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.

- Develop and use a model to describe how food is rearranged through chemical reactions.

Resources/Materials (copy hyperlinks for digital resources):
Discoveryeducation.com - online textbook
http://scienceworld.scholastic.com/
Food is Fuel-VIDEO-English and Spanish
NSTA Plant Growth and Gas Exchange
NSTA Plants and Energy (Respiration and Photosynthesis)
NSTA Investigating Photosynthesis
NSTA Interactive Interdependence
NSTA No More Plants
NSTA Chesapeake Bay Food Web
NSTA Modeling Marine Food Webs and Human Impact
NSTA Lab11. Food Webs and Ecosystems:Which Member of an Ecosystem Would Affect the Food Web the Most If Removed?
NSTA Habitable Planet Population Simulator
NSTA Lionfish-VIDEO-Ocean Bully
NSTA Dueling Mandates: Debating Issues Affecting Yellowstone National Park
NSTA Teacher Resource - Flow of Matter and Energy in Ecosystems
NSTA Exploring the "Systems" in Ecosystems
NSTA Florida Everglades: The River of Grass
http://www.calacademy.org/educators/lesson-plans/stomata-printing-microscope-investigation
http://www.calacademy.org/educators/lesson-plans/how-stable-is-your-food-web
http://www.calacademy.org/educators/lesson-plans/carbon-cycle-poster
http://www.calacademy.org/educators/lesson-plans/photosynthesis-seen-from-space
http://www.calacademy.org/educators/lesson-plans/sensational-seaweed
California Academy of Sciences -VIDEO-Take a Virtual Dive in a Kelp Forest
California Academy of Sciences-VIDEO-What Is the Environmental Impact of Feeding the World
California Academy of Sciences-VIDEO-How Do Trees Transport Water from Roots to Leaves
California Academy of Sciences-VIDEO-Waterwise Farms
https://www.brainpop.com/science/matterandchemistry/conservationofmass/
https://www.brainpop.com/science/cellularlifeandgenetics/cellularrespiration/
https://www.brainpop.com/science/energy/energypyramid/
https://www.brainpop.com/science/ecologyandbehavior/foodchains/
https://www.brainpop.com/science/cellularlifeandgenetics/photosynthesis/

Modifications:

- Special Education Students
  - Allow errors
- At-Risk Students
  - Provide extended time to complete tasks

- Rephrase questions, directions, and explanations
- Allow extended time to answer questions and permit drawing as an explanation
- Accept participation on any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

- English Language Learners
  - Assign a buddy, same language or English speaking
  - Allow errors in speaking
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  - Accept participation at any level, even one work
  - Consult with Guidance Counselors and follow I&RS procedures/action plans
  - Consult with other members of the 7th grade team for specific behavior interventions
  - Provide rewards as necessary

- Gifted and Talented Students
  - Provide extension activities
  - Build on students' intrinsic motivation
  - Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire Unit: 15 days
1	Scientific Explanation on the Role of Photosynthesis on Cycling Matter and Role of Energy	6 days
2	Model to Describe How Food Is Rearranged through Chemical Reactions	9 days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

http://www.state.nj.us/education/modelcurriculum/sci/7u2.shtml

http://ngss.nsta.org/Resource.aspx?ResourceID=247 Plant Growth and Gas Exchange Unit: This model unit from Michigan State University includes 11 lessons that guide students through the process of collecting evidence and developing explanations of where the dry matter of plants comes from and of the roles of photosynthesis and respiration in the carbon cycle. Along with the focus on building explanations of these core ideas, the unit explicitly integrates the crosscutting concepts of matter and energy and scale, proportion, and quantity. This unit is built around the question of how small seeds grow into large plants, and the core activities of the unit guide students in tracing the mass changes that occur as seeds germinate and grow. These core activities are supported through a carefully planned sequence of learning and assessment activities that follow a research-based learning progression to support the development of student understanding.

NSTA Translating the NGSS for Classroom Instruction

Content Area: Science

Unit Title: Unit 8-Earth Systems

Grade Level: 7

Unit Summary: Students examine geoscience data in order to understand processes and events in Earth's history. Important crosscutting concepts in this unit are scale, proportion, and quantity, stability and change, and patterns in relation to the different ways geologic processes operate over geologic time. An important aspect of the history of Earth is that geologic events and conditions have affected the evolution of life, but different life forms have also played important roles in altering Earth's systems. Students understand how Earth's geosystems operate by modeling the flow of energy and cycling of matter within and among different systems. Students investigate the controlling properties of important materials and construct explanations based on the analysis of real geoscience data. Students are expected to demonstrate proficiency in analyzing and interpreting data and constructing explanations. They are also expected to use these practices to demonstrate understanding of the core ideas.

Interdisciplinary Connections:

English Language Arts

- Cite specific textual evidence based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history to support analysis of science and technical texts.
- Write informative/explanatory texts to examine evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6 billion-year-old history and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
- Cite specific textual evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales to support analysis of science and technical texts.
- Use informative/explanatory texts to examine evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
- Include multimedia components and visual displays in presentations about evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales to clarify claims and findings and emphasize salient points.
- Cite specific textual evidence of past plate motion to support analysis of science texts.
- Integrate quantitative or technical information about evidence of past plate motions expressed in words in a text with a version of that information expressed in a flowchart, diagram, model, graph, or table.
- Compare and contrast the information gained from experiments, simulations, video, or multimedia sources showing evidence of past plate motion with that gained from reading a text on the same topic.

Mathematics

- Use variables to represent numbers and write expressions when solving problems while constructing explanations from evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history; understand that a variable can represent an unknown number or, depending on the purpose at hand, any number in a specific set.
- Use variables to represent quantities in a real-world or mathematical problem when solving problems while constructing explanations from evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

- Reason abstractly and quantitatively when analyzing evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
- Use variables to represent numbers and write expressions when solving a real-world or mathematical problem involving evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. Understand that a variable can represent an unknown number or, depending on the purpose at hand, any number in a specified set.
- Use variables to represent quantities in a real-world or mathematical problem involving evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
- Use numbers, symbols, and words while analyzing and interpreting data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of past plate motions.
- Use variables to represent numerical data and write expressions when solving a problems involved in the analysis of data about past plate motions. Understand that a variable can represent an unknown number or, depending on the purpose at hand, any number in a specified set.
- Use variables to represent quantities when analyzing data about past plate motions and construct simple equations and inequalities to solve problems by reasoning about the quantities.

21st Century
Themes and Skills:
CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP4: Communicate clearly and effectively and with reason.
CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective management.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Standards (Content and Technology):

CPI#:	Statement:
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.
MS-ESS2-1	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
MS-ESS2-2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
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.
Technology Standard 8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
Technology Standard 8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

Technology Standard 8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
Technology Standard 8.1.8.D.2	Create a database query, sort and create a report and describe the process, and explain the report results.
Technology Standard 8.1.8.D.4	Assess the credibility and accuracy of digital content.
Technology Standard 8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
Science and Engineering Practices	Developing and Using Models
Science and Engineering Practices	Constructing Explanations and Designing Solutions
Science and Engineering Practices	Analyzing and Interpreting Data
Crosscutting Concepts	Stability and Change
Crosscutting Concepts	Scale, Proportion and Quantity
Crosscutting Concepts	Patterns

Unit Essential Question(s):

- If no one was there, how do we know the Earth's history?
- What provides the forces that drive Earth's systems?
- How do we know that the Earth is approximately 4.6-billion-years-old?
- What drives the cycling of Earth's materials?
- Do all of the changes to Earth systems occur in similar time scales?
- How is it possible for the same kind of fossils to be found in New Jersey and in Africa?

Unit Enduring Understandings:

- The geologic time scale is used to organize Earth's 4.6-billion-year-old history.
- Rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history.
- 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.
- Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.
- Energy drives the process that results in the cycling of Earth's materials.
- The processes of melting, crystallization, weathering, deformation, and sedimentation act together to form minerals and rocks through the cycling of Earth's materials.

	• All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. • Energy flowing and matter cycling within and among the planet's systems derive from the sun and Earth's hot interior. • Energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. • Explanations of stability and change in Earth's natural systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. • Geoscience processes have changed Earth's surface at varying time and spatial scales. • Processes change Earth's surface at time and spatial scales that can be large or small; many geoscience processes usually behave gradually but are punctuated by catastrophic events. • Geoscience processes shape local geographic features. • 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. • Interactions among Earth's systems have shaped Earth's history and will determine its future. • Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. • Time, space, and energy phenomena within Earth's systems can be observed at various scales using models to study systems that are too large or too small. • Tectonic processes continually generate new sea floor at ridges and destroy old sea floor at trenches. • 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. • Patterns in rates of change and other numerical relationships can provide information about past plate motions.

	• The distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of past plate motions. • 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) provide evidence of past plate motions.

Unit Learning Targets/Objectives:

Students will

- 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.
- Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
- Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
- Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

Formative Assessments:

• Construct a scientific explanation based on valid and reliable evidence from rock strata obtained from sources (including the students' own experiments).

•Construct a scientific explanation based on rock strata 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.

•Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

•Construct a scientific explanation for how geoscience processes have changed Earth's surface at varying time and spatial scales based on valid and reliable evidence obtained from sources (including the students' own experiments).

•Construct a scientific explanation for how geoscience processes have changed Earth's surface at varying time and spatial scales based on 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.

•Collect evidence about processes that 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).

•Collect evidence about processes that change Earth's surface at time and spatial scales that can be 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.

Summative/Benchmark Assessment:

• Analyze and interpret data such as distributions of fossils and rocks, continental shapes, and seafloor structures to provide evidence of past plate motions.

•Analyze how science findings have been revised and/or reinterpreted based on new evidence about past plate motions.

•Choose from the menu 1 project to complete and present

Resources/Materials (copy hyperlinks for digital resources):
Discoveryeducation.com - online textbook
http://scienceworld.scholastic.com/
Rock Cycle Journey
NSTA Interactives Dynamic Earth
NSTA Crayon Rock Cycle
NSTA Continental Drift Activity
NSTA Dig This! Erosion Investigation
NSTA Musical Plates-A Study of Earthquakes and Plate Tectonics
NSTA Activity: A Plate Tectonics Puzzle
NSTA: Investigating Erosion
NSTA Virtual Lab-Fossil Data
California Academy of Sciences - Rock Cycle Roundabout
California Academy of Sciences - Teacher Guide: Earthquakes
Cal Academy of Sciences VIDEO-Plate Boundaries-Divergent-Convergent-Transform
Cal Academy of Sciences VIDEO-Plate Tectonics-Shaping the Continents
Cal Academy of Sciences VIDEO-The Great San Francisco Earthquake of 1906
60 Minutes-Historic Film: San Francisco Days Before the 1906 Earthquake
Cal Academy of Sciences VIDEO-Plate Tectonics and Ancient Civilizations
https://www.calacademy.org/educators/lesson-plans/earthquakes-and-tectonic-plates
USGS - Earthquakes for Kids
https://www.brainpop.com/science/earthsystem/mineralidentification/
https://www.brainpop.com/science/earthsystem/mountains/
https://www.brainpop.com/science/earthsystem/oceanfloor/
https://www.brainpop.com/science/earthsystem/platetectonics/
https://www.brainpop.com/science/earthsystem/rockcycle/
https://www.brainpop.com/science/earthsystem/soil/
https://www.brainpop.com/science/earthsystem/typesofrocks/
https://www.brainpop.com/science/earthsystem/volcanoes/
https://www.brainpop.com/science/weather/weathering/
https://www.brainpop.com/science/earthsystem/earthquakes/
https://www.brainpop.com/science/earthsystem/earthsstructure/
https://www.brainpop.com/science/earthsystem/erosion/
http://www.3dprinterworld.com/article/virtual-3d-printable-fossil-collection

Modifications:

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Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete) Entire Unit: 30 days
1	**Geologic Time Scale**	6 days
2	**Cycling of the Earth's Materials**	6 days
3	**Geoscience Processes and the Changing of the Earth's surfaces**	9 days
4	**Plate Tectonics and the History of the Earth**	9 days

Teacher Notes:

Additional Resources
Click links below to access additional resources used to design this unit:

http://www.state.nj.us/education/modelcurriculum/sci/7u8.shtml
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