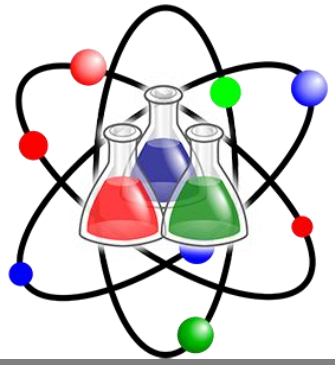
Secaucus Board of Education

6th Grade Science

Course Code: 4610, 4620, 5629

Science Department



Born December 2016
Aligned to NJSLS for Science (2014), ELA (2016), Mathematics (2016), Technology (2014), and 21st Century Life and Careers (2014)
Approved by the Secaucus Board of Education on December 15, 2016

District Equity Statement

The Board of Education directs that all students enrolled in the schools of this district shall be afforded equal educational opportunities in strict accordance with the law. No students shall be denied access to or benefit from any educational program or activity or from a co-curricular or athletic activity on the basis of the student's race, color, creed, religion, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, gender identity or expression, socioeconomic status, or disability. The Board directs the Superintendent to allocate faculty, administrators, support staff members, curriculum materials, and instructional equipment supplies among and between the schools and classes of this district in a manner that ensures equivalency of educational opportunity throughout this district. The school district's curricula in the following areas will eliminate discrimination, promote mutual acceptance and respect among students, and enable students to interact effectively with others, regardless of race, color, creed, religion, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, gender identity or expression, socioeconomic status, or disability:

1. School climate/learning environment
2. Courses of study, including Physical Education
3. Instructional materials and strategies
4. Library materials
5. Software and audio-visual materials
6. Guidance and counseling
7. Extra-curricular programs and activities
8. Testing and other assessments.

Excerpt from Secaucus Board of Education, Policy 5750, Edited September 2016

Course Description

The Sixth grade Science Curriculum is taught using *New Jersey Center for Teaching and Learning Progressive Science Initiative* coursework. All components of these units present a balance of Biological, Physical, Earth/Space and Environmental Science topics. The units covered in this course include: The Universe and its Stars, Earth and the Solar System, Evidence of Common Ancestry and Diversity, Ecosystem Dynamics, Disturbance and Biodiversity, Biodiversity and humans, Earth Materials, Systems, and Plate Tectonics, The Roles of Water in Earth's Surface Processes and Weather & Climate and Natural Hazards. All courses are designed to prepare students for The New Jersey Assessment of Skills and Knowledge in Science (NJ ASK 8 Science), their middle school science courses, and for solving simple scientific problems and issues in their everyday lives.

The material is presented at a moderate pace and can be adjusted for various levels taught. Lessons are based on discussions and student- driven activities. Hands-on activities are meant to show connections to real-life science applications, and to promote critical thinking and problem solving skills. Students who are placed in this course based on ESL placement will also receive appropriate accommodations based upon their ESL level. Students receiving Special Education services will receive modifications and accommodations to information and assessments as indicated in their Individual Education Plan.

Course Modifications (ELLs, Special Education, Gifted and Talented)

The course instructor will determine, with the assistance of guidance counselors, teacher assistant/aides, educational specialists, and/or special education teachers, what modifications will be made for his/her students. Such examples of modifications can include, but not be limited to:

- Extended time as needed
- Modification of tests and quizzes
- Preferential seating
- Alternative/Formative assessment (projects)
- Effective teacher questioning (ranging from simple recall to higher order critical thinking questions)

· Supplemental materials
· Cooperative learning
· Teacher tutoring
· Peer tutoring
· Differentiated Instruction

Interdisciplinary Connections

The following NJSLS for ELA and Mathematics depict what standards align to the science standards taught in this 6th Grade Science Course.

NJSLS - ELA/Literacy:

- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS1-3),(MS-ESS1-4)
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ESS1-3)
- WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS1-4)
- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ESS1-1),(MS-ESS1-2)
- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS2-2),(MS-ESS2-3),(MS-ESS2-5)
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ESS2-3)
- RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ESS2-3),(MS-ESS2-5)
- WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS2-2)

- WHST.6-8.8 Gather relevant information from multiple print and digital sources, using 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. (MS-ESS2-5)
- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ESS2-1),(MS-ESS2-2),(MS-ESS2-6)
- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS3-1),(MS-ESS3-2),(MS-ESS3-4),(MS-ESS3-5)
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ESS3-2)
- WHST.6-8.1 Write arguments focused on discipline content. (MS-ESS3-4)
- WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS3-1)
- WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-ESS3-3)
- WHST.6-8.8 Gather relevant information from multiple print and digital sources, using 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. (MS-ESS3-3)
- WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-ESS3-1),(MS-ESS3-4)
- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS2-1),(MS-LS2-2),(MS-LS2-4)
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-LS2-1)
- RST.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. (MS-LS2-5)
- RI.8.8 Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims. (MS-LS-4),(MS-LS2-5)
- WHST.6-8.1 Write arguments to support claims with clear reasons and relevant evidence. (MS-LS2-4)

- WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS2-2)
- WHST.6-8.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (MS-LS2-2),(MS-LS2-4)
- SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. (MS-LS2-2)
- SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. (MS-LS2-2)
- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS2-3)
- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions (MS-LS4-1),(MSLS4-2),(MS-LS4-3),(MS-LS4-4),(MS-LS4-5)
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-LS4-1),(MS-LS4-3)
- RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-LS4-3),(MS-LS4-4)
- WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS4-2),(MS-LS4-4)
- WHST.6-8.8 Gather relevant information from multiple print and digital sources, using 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. (MS-LS4-5)
- WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS4-2),(MS-LS4-4)
- SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. (MS-LS4-2),(MS-LS4-4)
- SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. (MS-LS4-2),(MS-LS4-4)

- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3)
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ETS1-3)
- RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ETS1-2),(MS-ETS1-3)
- WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-ETS1-2)
- WHST.6-8.8 Gather relevant information from multiple print and digital sources, using 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. (MS-ETS1-1)
- WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-ETS1-2)
- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ETS1-4)

NJSLS - Mathematics:

- MP.2 Reason abstractly and quantitatively. (MS-ESS1-3)
- MP.4 Model with mathematics. (MS-ESS1-1),(MS-ESS1-2)
- 6. RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-ESS1-1),(MS-ESS1-2),(MS-ESS1-3)
- 7. RP.A.2 Recognize and represent proportional relationships between quantities. (MS-ESS1-1),(MS-ESS1-2),(MS-ESS1-3)
- 6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS1-2),(MS-ESS1-4)
- 7. EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-ESS1-2),(MS-ESS1-4)
- MP.2 Reason abstractly and quantitatively. (MS-ESS2-2),(MS-ESS2-3),(MS-ESS2-5)

- 6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-ESS2-5)
- 6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS2-2),(MS-ESS2-3)
- 7. EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-ESS2-2),(MS-ESS2-3)
- MP.4 Model with mathematics. (MS-LS2-5)
- 6. RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-LS2-5)
- 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS2-3)
- 6. SP.B.5 Summarize numerical data sets in relation to their context. (MS-LS2-2)
- MP.4 Model with mathematics. (MS-LS4-6)
- 6. RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-LS4-4),(MS-LS4-6)
- 6. SP.B.5 Summarize numerical data sets in relation to their context. (MS-LS4-4),(MS-LS4-6)
- 6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-LS4-1),(MS-LS4-2)
- 7. RP.A.2 Recognize and represent proportional relationships between quantities. (MS-LS4-4),(MS-LS4-6)
- MP.2 Reason abstractly and quantitatively. (MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3),(MS-ETS1-4)
- 7. EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in

any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. (MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3)

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

The following NJSLS are also covered in this course:

21st Century Life and Careers - Career Ready Practices:

- 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 in solving them.
- CRP11. Use technology to enhance productivity.

Technology:

- 8.1.8. A.1 Demonstrate knowledge of a real world problem using digital tools.
- 8.1.8. A.2 Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
- 8.1.8. A.3 Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results
- 8.1.8. A.5 Create a database query, sort and create a report and describe the process, and explain the report results

6th Grade Science Curriculum

Unit 1: The Universe and Its Stars	Unit 2: Earth and the Solar System
ESS1.A: The Universe and Its Stars Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.(MS-ESS1-1) Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.(MS-ESS1-2)	**ESS1.B: Earth and the Solar System** The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.(MS-ESS1-2), (MS-ESS1-3) This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.(MS-ESS1-1) The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)
Unit 6: Evidence of Common Ancestry and Diversity	**Unit 7: Ecosystem Dynamics**
LS4.A:Evidence of Common Ancestry and Diversity The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. (MS-LS4-1) Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. (MS-LS4-2)	**LS2.A:Interdependent Relationships in Ecosystems** Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.(MS-LS2-1) In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.(MS-LS2-1) Growth of organisms and population increases are limited by access to resources.(MS-LS2-1) Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so

Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy.(MS-LS4-3)	Interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared.(MS-LS2-2) **LS2.B:Cycle of Matter and Energy Transfer in Ecosystems** Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)
Unit 8: Disturbance and Biodiversity	**Unit 9: Biodiversity and Humans**
LS2.C:Ecosystem Dynamics, Functioning, and Resilience Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.(MS-LS2-4) Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.(MS-LS2-5)	**LS4.D: Biodiversity and Humans** Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (MS-LS2-5) **ETS1.B: Developing Possible Solutions** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.(secondary to MS-LS2-5)

Unit 3: Earth Materials, Systems, and Plate Tectonics	Unit 4: The Roles of Water in Earth's Surface Processes
ESS2.A:Earth's Materials and Systems All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms.(MS-ESS2-1) The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. (MS-ESS2-2) **ESS2.B:Plate Tectonics and Large-Scale System Interactions** Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. (MS-ESS2-3) **ESS1.C:The History of Planet Earth** The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. (MS-ESS1-4)	**ESS2.C:The Roles of Water in Earth's Surface Processes** Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land.(MS-ESS2-4) Global movements of water and its changes in form are propelled by sunlight and gravity.(MS-ESS2-4) Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6) Water's movements—both on the land and underground— cause weathering and erosion, which change the land's surface features and create underground formations.(MS-ESS2-2)
Unit 5: Weather & Climate and Natural Hazards	
ESS2.C:The Roles of Water in Earth's Surface Processes The complex patterns of the changes and the movement of	

water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5) **ESS2.D:Weather and Climate** Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6) Because these patterns are so complex, weather can only be predicted probabilistically.(MS-ESS2-5) The ocean exerts a major influence on weather and climate by redistributing it through ocean currents.(MS-ESS2-6) **ESS3.B:Natural Hazards** Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)	

Unit 1 – Beginning of the Universe			
Teacher:	**SBOE**	**Time Frame:**	18 days (Depending on individual teacher schedule.)
Grade:	**6**	**School:**	SBOE
Subject:	**Middle School Science**		
NJSLS/DCI **MS-ESS1.A: The Universe and Its Stars** **MS-ESS1.B: Earth and the Solar System**	**Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1)** **Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2)** **The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1-2), (MS-ESS1-3)** **The model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1-1)** (Fully covered in Unit 2.) **The solar system appears to have formed from a disk of dust and gas drawn together by gravity. (MS-ESS2)** http://www.nextgenscience.org/msess1-earth-place-universe		
Instructional Objective: MS-ESS1-1.	**Develop and use a model of the Earth-Sun-Moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.**		

Instructional Objective: MS-ESS1-2.	**Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system**
Essential Questions	
(What questions will the student be able to answer as a result of the instruction?)	
1. How did our universe form? 2. What holds our galaxy and solar system together? 3. What determined the brightness of a star, and what are the properties of our Sun?	
Knowledge & Skills	
(What skills are needed to achieve the desired results?)	
By the end of this unit, students will know: ● Scientists hypothesize that the universe began with a "Big Bang." ● Celestial bodies (planets, stars, moons, etc.) are formed and are held in orbit by the force of gravity. ● The brightness of a star depends on its distance and size.	By the end of this unit, students will be able to: ● Explain the Big Bang Theory and evidence supporting it ● Identify the factors that determine the strength of gravity and explain gravity's role in our universe ● Describe the makeup of a star and the factors that determine a star's brightness
Assessment	
Acceptable evidence to show desired results	
During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below. Quiz 1: The Beginning of the Universe/ Galaxies Web quest: Galaxy Tour Lab 1: Gravity Lab 2: Apparent Motion of the Stars	

Webquest: Exploring Black Holes Unit Test			
Suggested Sequence			
Day	Topic	Class Work	Homework
1	Beginning of the Universe/Big Bang Theory	Smart Notebook Slides 4-21	#1
2	Beginning of the Universe/Big Bang Theory	Smart Notebook Slides 22-37; Classwork #1 Beginning of the Universe	#2-5
3	Galaxies	Smart Notebook Slides 38-46; Galaxy Tour Webquest	#6-7; Read Gravity Lab and form/write a hypothesis
4	Gravity Lab	Smart Notebook Slide 47	Finish Gravity Lab
5	Galaxies	Smart Notebook Slides 47-60	#8-10
6	Galaxies	Smart Notebook Slides 61-68; Classwork #2 Light-Years	Finish Classwork #2
7	Stars	Smart Notebook Slides 69-86; Review for quiz	Study for Quiz

8	Beginning of Universe/Galaxies	Quiz; Classwork #3 Stars	#11
9	Stars	Smart Notebook Slides 87-111	#12-15; Read Apparent Motion of the Stars Lab
10	Apparent Motion of the Stars	Lab	Finish Lab
11	Black Holes	Smart Notebook Slides 112-116; Black Holes Webquest	#16-18
12	Black Holes	Smart Notebook Slides 117-120; Classwork #4 Black Holes	#19-20; Study Guide
13	Unit Review	Unit Review	Study for Test
14	Unit Test	Unit Test	N/A

*While there are many slides for each topic, several slides within the notebook are hidden and won't be used during instructional time.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic.
***Lessons are based on 40 minute periods and may need to be adjusted to fit the schedule of your school.

Unit 2 – Earth and the Solar System			
Teacher:	**SBOE Faculty**	**Time Frame:**	25 days (Depending on individual teacher schedule).
Grade:	**6**	**School:**	SBOE
Subject:	**Middle School Science**		
NJSLS/DCI **MS-ESS1.A: The Universe and Its Stars** **MS-ESS1.B: Earth and the Solar System**	**Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1)** **Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2)** **The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1-2), (MS-ESS1-3)** **The model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1-1)** **The solar system appears to have formed from a disk of dust and gas drawn together by gravity. (MS-ESS2)** http://www.nextgenscience.org/msess1-earth-place-universe		
Instructional Objective: MS-ESS1-1.	**Develop and use a model of the Earth-Sun-Moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.**		
Instructional Objective: MS-ESS1-2.	**Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.**		

Instructional Objective: MS-ESS1-3.	**Analyze and interpret data to determine scale properties of objects in the solar system.**
Essential Questions	
(What questions will the student be able to answer as a result of the instruction?)	
4. What different types of objects can be found in our solar system? 5. Why do the objects in our solar system follow a curved path around our Sun? 6. What effects do the Moon and Sun have on us here on Earth?	
Knowledge & Skills	
(What skills are needed to achieve the desired results?)	
By the end of this unit, students will know: ● Characteristics of various celestial bodies, including the Sun and the Moon ● What causes the tides, solar/lunar eclipses, and seasons	By the end of this unit, students will be able to: ● Describe the celestial bodies in our solar system ● Explain what effects the motions of the Earth, Sun and Moon have on us (particularly the Tides, Eclipses, and Seasons).
Assessment	
Acceptable evidence to show desired results	
During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below. Quiz 1: Birth of Our Sun and Our Solar System Research: The Planets Solar Distances Activity Comet Lab Quiz 2: Types of Celestial Bodies Lab: Orbit Webquest: Solar System – Revolution	

Quiz 3: The Motion of Objects Around the Sun
Quiz 4: The Moon and the Tides
Eclipse Activity
Unit Test

Suggested Sequence

Day	Topic	Classwork	Homework
1	Birth of Our Sun and the Solar System	Slides #5-17 Classwork #1	#1-5
2	Types of Celestial Bodies	Slides #18-34 Classwork #2	Study for quiz
3	Birth of Our Sun and the Solar System; Planets	Quiz Slides #35-48	#6-9
4	Celestial Bodies	Slides # 49-65	Finish Planet Research
5	Celestial Bodies	Slide #66 Solar Distances Activity	Finish lab packet
6	Celestial Bodies	Slides #67-98 Classwork #3	#10-13

7	Celestial Bodies	Comet Lab	Finish Lab packet
8	The Motion of Objects Around the Sun	Slides #99-110 Review for quiz	Study for quiz
9	Celestial Bodies	Quiz Classwork #4	#14-18
10	The Motion of Objects Around the Sun	Orbits Lab	Finish lab packet
11	Web quest Solar System - Revolution	Slide #111 Webquest Packet	Finish Webquest; Study for quiz
12	Earth's Moon	Slides #112-125 Review for quiz	Study for quiz
13	The Motion of Objects around Our Sun; Earth's Moon	Quiz Classwork #5	#19-22
14	Earth's Moon	Slides #126-142 Classwork #6	#23-26
15	Tides	Slides #143-156; Classwork #7	#27-31
16	Eclipses	Slides #157-170; Review for quiz	Study for quiz

17	The Moon and Tides; Eclipses	Quiz Classwork #8	#32-36
18	Eclipses	Eclipse Activity	Finish activity handout
19	Seasons	Slides #171-187; Classwork #9	#37-43
20	Unit Review	Study Guide	Study for test
21	Unit Test	Test	N/A

*While there are many slides for each topic, several slides within the notebook are hidden and won't be used during instructional time.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic.
***Lessons are based on 40 minute periods, you may need to be adjusted to fit your school's schedule.

Unit 6 – Evidence of Common Ancestry and Diversity			
Teacher:	**SBOE**	**Time Frame:**	18 days (Depending on Individual teacher schedule).
Grade:	**6**	**School:**	SBOE
Subject:	**Middle School Science**		
NJSLS/DCI **LS4.A: Evidence of Common Ancestry and Diversity** **ESS1.C: The History of Planet Earth**	**The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. (MS-LS4-1)** **Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. (MS-LS4-2)** **Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy. (MS-LS4-3)** **The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. (MS-ESS1-4)** http://www.nextgenscience.org/msls4-biological-evolution-unity-diversity		
Instructional Objective: MS-LS4-1.	**Construct an explanation based on evidence for the placement of fossil in chronological order.**		
Instructional Objective: MS-LS4-2.	**Develop and use a model to describe the similarities and differences between various organisms.**		

Instructional Objective: MS-LS4-2.	**Develop and use a model to reconstruction of evolutionary history and the inference of lines of evolutionary descent.**
Instructional Objective: MS-LS4-3.	**Analyze and interpret data on the embryological differences and similarities of different species not evident in fully-formed anatomy.**
Instructional Objective: 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.**

Essential Questions

(What questions will the student be able to answer as a result of the instruction?)

7. What are fossils and how are they created?
8. What is the geological timeline?
9. What evolution and what are the mechanisms for evolution?
10. How do anatomical similarities and differences help reconstruct evolutionary history?
11. What is embryological development and how does it support a common ancestry?

Knowledge & Skills

(What skills are needed to achieve the desired results?)

By the end of this unit, students will know:	By the end of this unit, students will be able to:
● How fossils are created, types of fossils and the transformational methods. ● How fossils are dated and what they reveal about Earth's history. ● How similarities and differences provide evidence for evolution ● How embryological differences provide clues not evident in fully formed anatomy	● Describe the different types of fossils and how they are formed. ● Explain the impact of fossils ● Describe the mechanisms for evolution ● Describe the theory of evolution and common ancestry

Assessment

Acceptable evidence to show desired results

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Activity 1: Fossil Cast Activity

Quiz 1: Fossils

Activity 2: Geological Timeline

Quiz 2: Geological Timeline

Activity 3: Classifying Collage Activity

Quiz 3: Similarities and Evolution

Unit Test: Evidence of Common Ancestry and Diversity

Suggested Sequence

Day	Topic	Classwork	Homework
1	Fossils	Slides #4-14; Questions #1-3	Homework #4-7
2-3	Types of Fossils	Slides #15-28 Questions #8	Homework #9-10

		Fossil Cast Activity	
4	Fossilization Process	Slide #29-40 Questions #11	Homework #12-13
5-7	Geological Timeline	Fossil Quiz Slides #41-52 Questions #14-16 Geological Timeline Activity	Homework #17-19
8-9	Dating Fossils	Slides #53-67 Questions #20-24	Homework #25-27
10	Similarities and Differences	Geological Timeline Quiz Slides #68-86 Questions #28-31	Homework #32-35
11-12	Evolution & Embryological Development	Slides #87-103 Questions #36-41	Homework #42-46

13	Unit Review	Similarities and Evolution Quiz Study Guide	Homework #36-39
12	Test Review	Jeopardy Review Game	Study for Test
14	Unit Test	N/A	N/A

Unit 7 – Ecosystem Dynamics			
Teacher:	**Faculty SBOE**	**Time Frame:**	21 Days (depending on individual teacher schedule).
Grade:	**6**	**School:**	SBOE
Subject:	**Middle School Science**		
NJSLS/DCI: **MS-LS2.A: Interdependent Relationships in Ecosystems**	Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.(MS-LS2-1) In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.(MS-LS2-1) Growth of organisms and population increases are limited by access to resources.(MS-LS2-1) Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared.(MS-LS2-2) Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)		
MS-LS2.B: Cycle of Matter and Energy Transfer in Ecosystems			

Instructional Objective: MS-LS2-1	**Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.**
Instructional Objective: MS-LS2-2	**Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.**
Instructional Objective: MS-LS2-3	**Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem**
Instructional Objective: MS-LS2-4	**Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.**
Instructional Objective: MS-LS2-5	**Evaluate competing design solutions for maintaining biodiversity and ecosystem services.***

Essential Questions

(What questions will the student be able to answer as a result of the instruction?)

12. What are the different levels of ecology?
13. What are the factors within an ecosystem?
14. What are the requirements of living things?
15. How do organisms compete for resources?
16. What is the effect of predators in an ecosystem?
17. What are the mutually beneficial relationships in an ecosystem?
18. How is matter and energy transferred in food webs?
19. What is the relationship among producers, consumers, and decomposers?

Knowledge & Skills

(What skills are needed to achieve the desired results?)

By the end of this unit, students will know:	By the end of this unit, students will be able to:

• The levels of ecological organization. • The difference between biotic and abiotic factors. • How competition, predator/prey and mutualism affect populations. • Various factors that affect population size. • The roles of producers, consumers and decomposers. • How energy cycles through an ecosystem. • How a food web shows the flow of energy.	• Give examples of the levels of ecology. • Give examples of competition, predator/prey and mutualism. • Describe how organisms depend on their environment. • Explain how population size changes based on various factors. • Describe the roles of producers, consumers and decomposers. • Describe the transfer of energy through organisms in a food chain.

Assessment

Acceptable evidence to show desired results

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Breaking it Down Activity

Stranded! Activity

Quiz 1: Ecology and Ecological Interactions

Coral Reef Fish Survey Activity

RAFT Breaking It Down Activity

Desert Food Web Activity

Quiz 2: Population Dynamics and Food Webs

Unit Test			
Suggested Sequence			
Day	Topic	Classwork	Homework
1	Energy in Food Webs	Slide 4; Begin Breaking It Down Activity	N/A
2-3	Intro to Ecology	Slides 5-25; Classwork #1	Homework #1
4	Intro to Ecology	Slide 26; Stranded! Activity	Finish activity worksheet
5	Intro to Ecology	Stranded! Press Conferences	N/A
6	Ecological Interactions	Slides 27-47	N/A
7	Ecological Interactions	Slides 48-58; Case Study: Coral Reef Interactions Worksheet Classwork #2	Homework #2
8	Population Dynamics	Slides 59-78	Study for quiz
9	Ecology & Interactions	Quiz 1	N/A
10	Population Dynamics	Slides 79-88; Classwork #3	Homework #3

11	Population Dynamics	Slide 89; Coral Reef Fish Survey Activity	Finish activity worksheet
12	Energy in Food Webs	Slides 90-102; Analyze Breaking It Down Data	Finish lab worksheet
13	Energy in Food Webs	Slides 103-114; Classwork #4	Homework #4
14	Energy in Food Webs	Slide 115; Desert Food Web Activity	Study for quiz
15	Population Dynamics and Food Webs	Quiz 2	Study guide
16	Unit Review	Unit review/study guide	Study for test
17	Unit Test	Unit Test	N/A

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***Lessons are based on 40 minute periods and may need to be adjusted to fit the schedule of your school.

Unit 8 – Disturbance and Biodiversity			
Teacher:	SBOE Faculty	**Time Frame:**	18 days (Depending on individual teacher schedule).
Grade:	**6**	**School:**	SBOE
Subject:	**Middle School Science**		
NJSLS/DCI **MS-LS2.c Ecosystems: Interactions, Energy, and Dynamics**	**Ecosystem Dynamics, Functioning, and Resilience** • **Ecosystems are dynamic in nature; their characteristics can vary over time. (MS-LS2-c)** • **Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-c)** • **Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. (MS-LS2-c)** • **The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-c)**		
Instructional Objective: MS-LS2.c	**Construct and present arguments supported by empirical evidence and scientific reasoning for multiple explanations for how changes to physical or biological components of an ecosystem result in changes to the populations in the ecosystem. MS-LS2.c**		
Instructional Objective: MS-LS2.c	**Recognize patterns in data and make warranted inferences about changes in populations, and evaluate evidence that supports multiple explanations for the changes. MS-LS2.c**		
Instructional Objective: MS-LS2.g	**Make an oral or written argument from evidence to support or refute the merits and constraints of different plans to solve a real world problem to restore a disrupted ecosystem. MS-LS2.g**		
Essential Questions			
(What questions will the student be able to answer as a result of the instruction?)			
1. What is biodiversity?			

2. What is ecosystem resilience?
3. What is the relationship between biodiversity and resilience?
4. What is a disturbance?
5. How does a disturbance to one part of an ecosystem affect other parts of an ecosystem?
6. What is the relationship between disturbance and biodiversity?
7. What are the steps to ecological succession?

Knowledge & Skills

(What skills are needed to achieve the desired results?)

By the end of this unit, students will know:	By the end of this unit, students will be able to:
● The relationships between biodiversity, resilience and disturbance. ● Examples of disturbances. ● How disturbances can affect an entire ecosystem. ● How levels of disturbances affect biodiversity. ● The steps of ecological succession.	● Describe biodiversity, resilience and disturbance. ● Explain the relationship between biodiversity and ecosystem resilience. ● Describe examples of how disturbances affect entire ecosystems. ● Explain the relationship between disturbances and biodiversity. ● Contrast primary and secondary succession. ● Describe how soil is created during succession.

Assessment

Acceptable evidence to show desired results

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Activity: Calculating Biodiversity
Activity: Biodiversity & Disease
Quiz 1: Biodiversity and Disturbance

Activity: Ecology Liaison			
Suggested Sequence			
Day	Topic	Classwork	Homework
1	Biodiversity	Slides 4-12; Activity: Calculating Biodiversity	Finish activity worksheet
2	Biodiversity	Slides 13-16; Activity: Biodiversity & Disease	Finish activity worksheet
3	Biodiversity	Slides 17-21; Classwork #1	Homework #1
4	Disturbance	Slides 22-35	N/A
5	Disturbance	Slides 36-45; Classwork #2	Homework #2
6	Succession	Slides 46-57; Review for quiz	Study for quiz

7	Biodiversity & Disturbance; Succession	Quiz 1; Slides 58-67	N/A
8	Succession	Slides 68-77; Classwork #3	Homework #3
9	Succession	Slide 78 Activity: Ecology Liaison	Finish activity worksheet; Study Guide
10	Succession; Unit Review	Discussion of Activity: Ecology Liaison; Unit Review	Study for test
11	Unit Test	Unit Test	N/A

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Unit 9 - Biodiversity and Humans			
Teacher:	**SBOE Faculty**	**Time Frame:**	18 days (Depending on individual teacher schedule).
Grade:	**6th Grade**	**School:**	SBOE
Subject:	**Middle School Science**		

NJSLS/DCI **MS-LS4.D:Biodiversity and Humans** **ETS1.B:Developing Possible Solutions**	Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (MS-LS2-5) There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.(secondary to MS-LS2-5) http://www.nextgenscience.org/msls2-ecosystems-interactions-energy-dynamics
Instructional Objective: **MS-LS2-5**	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
Common Core Math Standards	6. RP.3: Use ratio and rate reasoning to solve real-world and mathematical problems. 6. NS.3: Fluently add, subtract, multiply and divide multi-digit decimals using the standard algorithm for each operation.

Essential Questions

(What questions will the student be able to answer as a result of the instruction?)

1. What is an ecosystem service?
2. What are the four categories of ecosystem services?
3. How are ecosystem services linked to biodiversity?
4. What are threats to biodiversity?

5. How can biodiversity be conserved?
6. How can ecosystems be restored?

Knowledge & Skills

(What skills are needed to achieve the desired results?)

By the end of this unit, students will know:

- The many different ways in which humans benefit from the ecosystem.
- That ecosystem services are linked to biodiversity.
- The current state of the world's biodiversity is rapidly declining.
- Most threats to habitats and ecosystems that cause biodiversity loss is caused by humans.
- Humans can conserve, preserve and restore ecosystems in order to support thriving biodiversity.

By the end of this unit, students will be able to:

- Explain examples of each category of ecosystem services.
- Describe how biodiversity is linked to each category of ecosystem services.
- Discuss different ways that a changing biodiversity can impact humans.
- Identify and describe the threats that contribute to the decline of biodiversity (overexploitation and extinction, habitat destruction, habitat fragmentation, pollution, acid rain, invasive species, climate change).
- Describe methods used to conserve, preserve and restore ecosystems and hence, biodiversity.
- Evaluate conservation/preservation and restoration methods to determine how well they meet certain criteria for different scenarios.

Assessment

Acceptable evidence to show desired results

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Quiz 1: Ecosystem Services & Biodiversity

Activity: Calculating Edge Effects

Quiz 2: Threats, Conservation and Preservation

Lab: A-maze-d by the Pollution

Lab: Water Filtration

Unit Test

Suggested Sequence

Day	Topic	Classwork	Homework
1	Ecosystem Services	Slides 1-24	N/A
2	Ecosystem Services	Slides 25-39; Classwork #1	Homework #1
3	Ecosystem Services & Biodiversity	Slides 40-50; Classwork #2	Homework #2
4	Threats to Biodiversity	Slides 51-69	Study for Quiz
5	Ecosystem Services & Biodiversity; Threats to Biodiversity	Quiz 1; Slide 70 Activity: Calculating Edge Effects	Finish activity worksheet
6	Threats to Biodiversity	Slides 71-81; Classwork #3	Homework #3

7	Threats to Biodiversity	Slides 82-86	N/A
8-9	Conservation and Preservation	Slides 87-109; Classwork #4	Homework #4
10	Restoration Ecology	Slides 110-119	Study for quiz
11	Threats to Biodiversity; Conservation and Preservation; Restoration Ecology	Quiz 2; Classwork #5	Homework #5
12	Restoration Ecology	Slides 120-123; Lab: A-maze-d by the Pollution	Finish activity worksheet
13	Restoration Ecology	Slides 124-125; Lab: Water Filtration	Finish activity worksheet; Study guide
*Optional	Local Biodiversity	Activity	
*Optional	Threat to Local Biodiversity	Activity	
14	Unit Review	Unit Review	Study for test
15	Unit Test	Unit Test	N/A

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***Lessons are based on 40 minute periods and may need to be adjusted to fit the schedule of your school.

Unit 3 – Plate Tectonics			
Teacher:	**SBOE Faculty**	**Time Frame:**	18 Days
Grade:	**6**	**School:**	SBOE
Subject:	**Middle School Science**		

NJSLS/DCI **MS-ESS2.A: Earth's Materials and Systems**	**All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms (MS-ESS2-1)** **The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future (MS-ESS2-2)** http://www.nextgenscience.org/msess2-earth-systems
MS-ESS2.B: Plate Tectonics and Large-Scale System Interactions	**Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart (MS-ESS2-3)** http://www.nextgenscience.org/msess2-earth-systems
Instructional Objective: MS-ESS2-2:	**Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.**
Instructional Objective: 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.**

Essential Questions
(What questions will the student be able to answer as a result of the instruction?)
20. Have the Earth's continents always looked the way they do today?

21. What causes Earth's continents to move?
22. In what ways do Earth's plates interact? What happens at these plate boundaries?
23. What causes earthquakes, tsunamis and volcanoes?

Knowledge & Skills

(What skills are needed to achieve the desired results?)

By the end of this unit, students will know:	By the end of this unit, students will be able to:
● Earth's continents were once all connected in one supercontinent ● Earth's plates continue to move still today as a result of convection currents in the mantle ● Earth's plates meet at convergent, divergent and transform boundaries ● Convergent boundaries create mountain ranges ● Divergent boundaries cause seafloor spreading ● Transform boundaries can result in earthquakes ● Tsunamis are caused by underwater earthquakes ● Volcanoes can form at both convergent and divergent plate boundaries	● Explain how fossil records provide scientists with evidence of continental drift and Pangaea ● Relate the convection currents in the mantle to the motion of the tectonic plates on the surface ● Identify the three types of plate boundaries and explain how plate interactions reshape Earth's surface

Assessment

Acceptable evidence to show desired results

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Quiz 1 : Pangaea – Energy Flow

Lab: Plate Tectonics

Activity: Tabletop Earthquake

Activity: Tabletop Tsunami

Activity: Tabletop Volcano

Unit Test

Suggested Sequence

Day	Topic	Classwork	Homework
1	Intro to Plate Tectonics	Slides 1-8; Plate Tectonics Intro Lab	Finish activity handout
2	Pangaea	Slides 9-25; Pangaea Classwork	Pangaea Homework
3	Pangaea	Slides 26-28; Changes in the Land Classwork	N/A
4	Energy Flow	Slides 29-42; Energy Flow Classwork	Energy Flow Homework

5	Types of Plate Interactions	Slides 43-57; Growth of a Mountain Classwork	Study for quiz
6	Pangaea/Energy Flow	Quiz 1; Finish Growth of a Mountain Classwork	N/A
7	Types of Plate Interactions	Slides 58-69; Type of Plate Interactions Classwork	Type of Plate Interactions Homework
8	Natural Disasters	Slides 70-84	N/A
9	Natural Disasters	Slide 85; Tabletop Earthquake Activity	Finish activity worksheet
10	Natural Disasters	Slides 86-93;	N/A
11	Natural Disasters	Slide 94; Tabletop Tsunami Activity	Finish activity worksheet
12	Natural Disasters	Slides 95-106; Natural Disasters Classwork	Natural Disasters Homework
13	Natural Disasters	Slide 107; Tabletop Volcano Activity	Finish activity worksheet

14	Test Review	Review activity; Study Guide	Study Guide
15	Unit Test	N/A	N/A

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**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic.
***Pacing guide is based on 40 minute class periods, you may need to adjust based on your school's schedule.

Unit 4 – The Role of Water in Earth's Surface Processes			
Teacher:	SBOE	**Time Frame:**	21 days (Depending on individual teacher schedule).
Grade:	**6**	**School:**	SBOE
Subject:	**Middle School Science**		
NJSLS/DCI **MS-ESS2.C: The Roles of Water in Earth's Surface Processes**	• **Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4)** • **The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5)** • **Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4)** • **Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6)** • **Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. (MS-ESS2-2)** http://www.nextgenscience.org/msess2-earth-systems		
Instructional Objective:	**Construct an explanation based on evidence for how geoscience processes have changed**		

MS-ESS2-2.	**Earth's surface at varying time and spatial scales.**
Instructional Objective: MS-ESS2-4.	**Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.**
Instructional Objective: MS-ESS2-5.	**Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.**
Instructional Objective: MS-ESS2-6.	**Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation determine regional climates.**

Essential Questions

(What questions will the student be able to answer as a result of the instruction?)

24. What is the water cycle?
25. How is water recycled?
26. What effect does sunlight and gravity have on the water cycle?
27. What causes the ocean currents and tides?
28. How does water contribute to weathering and erosion?

Knowledge & Skills

(What skills are needed to achieve the desired results?)

By the end of this unit, students will know:	By the end of this unit, students will be able to:
● Stages of the water cycle, including relevant vocabulary. ● What causes global movement of water? ● How differences in temperature and salinity form a global pattern of currents. ● How weathering and erosion caused by water's movement change the lands features.	● Describe the water cycle and the forces that drive it. ● Explain the impact of sunlight and gravity on global movements of water. ● Identify the global pattern of interconnected ocean currents. ● Describe the difference between weathering and erosion along with their impact on landforms.

Assessment

Acceptable evidence to show desired results

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Activity 1: Changing Water

Quiz 1: Water Cycle

Activity 2: It's All Connected – Global Circulation

Quiz 2: Forces of the Water Cycle / Global Currents

Activity 3: Erosion and Weathering

Quiz 4: Weathering and Erosion

Unit Test

Suggested Sequence

Day	Topic	Classwork	Homework
1-2	The Water Cycle	Slides 1-30; Water Cycle Classwork	Water Cycle Homework
3	States of Matter in the Water Cycle	Slides 31-42 States of Matter Classwork	States of Matter Homework

4	States of Matter in the Water Cycle	States of Matter Classwork #2 (Nat Geo Reading)	N/A
5	States of Matter of the Water Cycle	Slide #43 Changing Water Activity	Study for quiz
6	The Water Cycle	Quiz #1	N/A
7	Forces of the Water Cycle	Slides #44-50 Forces of the Water Cycle Classwork #15-16	Forces of the Water Cycle Homework #18-19
8	Forces of the Water Cycle	Forces of the Water Cycle Classwork #2 (Nat Geo Reading)	N/A
9	Forces of the Water Cycle	Slides #51-60; Forces of the Water Cycle Classwork #17	Forces of the Water Cycle Homework #20-21
10	Global Ocean Currents	Slides #61-73 Classwork #22-26	Homework #27-30
11	Global Water Circulation	Slide #74 It's All Connected – Global Circulation Activity	Finish activity; Study for quiz
12	Forces of the Water Cycle; Global Ocean Currents; Erosion and Weathering	Quiz #2; Erosion and Weathering Classwork #1 (SF Gate Reading)	Finish classwork

13	Erosion and Weathering	Slides #75-85 Erosion and Weathering Classwork	Erosion and Weathering Homework
14	Erosion and Weathering	Slides #86-87 Erosion and Weathering Activity 1 and Activity 2: Day 1	N/A
15	Erosion and Weathering	Slides #87-88 Erosion and Weathering Activity 2: Day 2 and Activity 3	Study for quiz
16	Erosion and Weathering	Quiz #3; Begin Study Guide	Study Guide
17	Unit Review	Study Guide; Unit Review	Study for test
18	Unit Test	Unit Test	N/A

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Unit 5 – Weather & Climate and Natural Hazards			
Teacher:	**SBOE Faculty**	**Time Frame:**	23 days (Depending on individual teacher schedule)
Grade:	**6**	**School:**	SBOE
Subject:	**Middle School Science**		

NJSLS/DCI **MS-ESS2.C: The Roles of Water in Earth's Surface Processes** **MS-ESS2.D: Weather and Climate** **MS-ESS3.B: Natural Hazards**	**The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5)** **Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6)** **Because these patterns are so complex, weather can only be predicted probabilistically.(MS-ESS2-5)** **The ocean exerts a major influence on weather and climate by redistributing it through ocean currents.(MS-ESS2-6)** **Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)** http://www.nextgenscience.org/msess2-earth-systems

	http://www.nextgenscience.org/msess3-earth-human-activity
Instructional Objective: MS-ESS2-5.	**Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.**
Instructional Objective: MS-ESS2-6.	**Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.**
Instructional Objective: MS-ESS3-2.	**Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.**

Essential Questions	
(What questions will the student be able to answer as a result of the instruction?)	
29. What factors affect weather and climate? 30. How do meteorologists predict the weather? 31. What are natural disasters and how are they predicted?	
Knowledge & Skills	
(What skills are needed to achieve the desired results?)	
By the end of this unit, students will know: ● The effect that various factors have on weather and climate. ● How atmospheric and oceanic circulation occurs. ● What probability forecasting is and how it is used. ● What natural disasters are how they are predicted?	By the end of this unit, students will be able to: ● Describe the effects that factors and locations have on weather and climate. ● Describe how circulation transports heat and moisture around the Earth. ● Translate information on a weather map into a weather forecast. ● Create a weather map based on information. ● Explain how natural disasters can be predicted.
Assessment	
Acceptable evidence to show desired results	
During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a	

combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Demo: Temperature and Circulation
Demo: Heat Capacity
Activity: Ocean Circulation Simulation
Quiz 1: Sunlight and Circulation
Lab: Climate Trends
Activity: Weather Prediction
Quiz 2: Geography and Weather Prediction
Unit Test

Suggested Sequence

Day	Topic	Class Work	Homework
1-2	Sunlight and the Atmosphere	Slides 4-26; Global Warming Worksheet	N/A
3	Sunlight and the Atmosphere	Slides 27-37; Classwork #1	Homework #1
4	Circulation	Slides 39-53; Temperature and Circulation Demo	N/A
5-6	Circulation	Slides 54-61; Heat Capacity Demo	N/A

7	Circulation	Slides 62-66; Ocean Circulation Simulation	N/A
8	Circulation	Slides 67-76; Classwork #2	Homework #2
9	Geography	Slides 77-90	Study for quiz
10	Sunlight and Circulation	Quiz 1	N/A
11	Geography	Slides 96-114	N/A
12	Geography	Slides 115-119; Classwork #3; Begin Climate Trends Lab	Homework #3
13	Geography	Climate Trends Lab	N/A
14	Weather Prediction	Slides 120-135; Classwork #4	Homework #4
15	Weather Prediction	Slide 136 Weather Prediction Activity	Study for quiz

16	Geography and Weather Prediction	Quiz 2	N/A
17	Natural Disasters	Slides 137-151	N/A
18	Natural Disasters	Slides 152-161; Classwork #5	Homework #5
19	Unit Review	Unit Review; Study Guide	Study for Test
20	Unit Test	Unit Test	N/A

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