Secaucus Board of Education

7th Grade Science

Course Codes: 4710, 4720, 5729

Science Department

Born December 2016
Aligned to the NJSLS for Science (2014), ELA, Mathematics, Technology, and 21st Century Life and Careers
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

7th Grade Science Course Descriptions and levels

The Seventh 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: Structure and Properties of Matter, Chemical Reactions, Matter and Energy in Organisms and Ecosystems, Interdependent Relationships in Ecosystems, and Earth's Systems. All courses are designed to prepare students for The New Jersey Assessment of Skills and Knowledge Science (NJASK 8 Science), their middle school and high school science courses, and for potentially solving scientific problems and issues in their everyday lives.

Science 7, Inclusion

The material in the class is presented at a slower pace compared to the other courses offered in order to accommodate those students who have difficulty keeping up with the rate of a regular class. Concepts are covered not only at a slower pace, but also with more teacher support during hands-on activities and discussions. This class has an inclusion setting for those students who have an IEP, which may state that he or she requires in-class support of a special education teacher. As such, there is a special education teacher who will team-teach the class each day. Students who are placed in this course based on ESL placement will also receive accommodations based upon their ESL level. Upon completion of this course, students will continue to be enrolled in Integrated Science 8- Inclusion course, or can be enrolled in Integrated Science 8- Average.

Science 7, Average

The material is presented at a moderate pace. Lessons are based on student- driven activities and discussions, which require the student to be a somewhat independent learner. Hands-on activities are meant to show connection 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 accommodations based upon their ESL level. Upon completion of this course students will continue in the program and enroll in integrated Science-8, or upon teacher recommendation may be enrolled in Integrated Science-8, Accelerated, or Honors.

Science 7, Accelerated

This course is designed for those students who are more independent learners, and who have the ability to master concepts at a faster pace than that of the average student. Students in this class are challenged with additional activities, readings, and discussions beyond that of the regular class in order to further promote and enhance higher-order thinking skills, and scientific processes. Students who are placed in this course based on ESL placement will also receive accommodations based upon their ESL level. Students enrolled in this course are required to participate in the Secaucus Middle School Science Fair. In order for a student to be placed in Accelerated Science, he/she must receive a score of 88 or better on a placement test and be recommended by their sixth grade science teacher.

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 New Jersey Learning Standards depict what standards align to the science standards taught in this 7th Grade Science Course.

NJSLS - ELA/Literacy:

- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions (MS-PS1-2),(MS-PS1-3)
- RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS1-6)
- 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-PS1-1),(MS-PS1-2),(MS-PS1-4),(MS-PS1-5)
- 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-PS1-6)
- 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-PS1-3)
- 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-PS3-1),(MSPS3-5)
- RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS3-3),(MS-PS3-4)
- 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-PS3-1)
- WHST.6-8.1 Write arguments focused on discipline content. (MS-PS3-5)
- 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-PS3-3),(MS-PS3-4)

- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-PS3-2)
- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3),(MS-LS1-4),(MS-LS1-5),(MS-LS1-6)
- RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. (MS-LS1-5),(MS-LS1-6)
- RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. (MSLS1-3),(MS-LS1-4)
- WHST.6-8.1 Write arguments focused on discipline content. (MS-LS1-3),(MS-LS1-4)
- WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS1-5),(MS-LS1-6)
- WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-LS1-1)
- WHST.6-8.8 Gather relevant information from multiple print and digital sources, 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-LS1-8)
- WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS1-5),(MS-LS1-6)
- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS1-2),(MS-LS1-7)
- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS3-1),(MS-LS3-2)
- RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics. (MS-LS3-1),(MS-LS3-2)
- 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-LS3-1),(MS-LS3-2)

- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS3-1),(MS-LS3-2)
- 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-PS1-1),(MS-PS1-2),(MS-PS1-5)
- MP.4 Model with mathematics. (MS-PS1-1),(MS-PS1-5)
- 6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS1-1),(MS-PS1-2),(MS-PS1-5) 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-PS1-4)
- 8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. (MS-PS1-1)
- 6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (MS-PS1-2)
- 6.SP.B.5 Summarize numerical data sets in relation to their context (MS-PS1-2)
- MP.2 Reason abstractly and quantitatively. (MS-PS3-1),(MS-PS3-4),(MS-PS3-5)
- 6.RP.A.1 Understand the concept of ratio and use ratio language to describe a ratio relationship between two quantities. (MS-PS3-1),(MS-PS3-5)
- 6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. (MS-PS3-1)
- 7.RP.A.2 Recognize and represent proportional relationships between quantities. (MS-PS3-1),(MS-PS3-5)
- 8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. (MS-PS3-1)

- 8.EE.A.2 Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. (MS−PS3−1)
- 8.F.A.3 Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. (MS-PS3-1),(MSPS3-5)
- 6.SP.B.5 Summarize numerical data sets in relation to their context. (MS-PS3-4)
- 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-1),(MS-LS1-2),(MS-LS1-3),(MS-LS1-6)
- 6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. (MSLS1-4),(MS-LS1-5)
- 6.SP.B.4 Summarize numerical data sets in relation to their context. (MS-LS1-4),(MS-LS1-5)
- MP.4 Model with mathematics. (MS-LS3-2)
- 6.SP.B.5 Summarize numerical data sets in relation to their context. (MS-LS3-2)
- 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)

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.

7th Grade Science Curriculum Plan

Unit 1: Matter and Its Properties	Unit 2: Chemical Reactions & Energy
PS1.A: Structure and Properties of Matter Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.(MS-PS1-1) Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.(MS-PS1-2),(MS-PS1-3) Gases and liquids are made of molecules or inert atoms that are moving about relative to each other.(MS-PS1-4) In a liquid, the molecules are constantly in contact with others; In a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.(MS-PS1-4) Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).(MS-PS1-1) The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.(MS-PS1-4)	**PS1.B: Chemical Reactions** Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.(MS-PS12),(MS-PS1-3),(MS-PS1-5) The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5) Some chemical reactions release energy, others store energy. (MS-PS1-6) **PS3.A: Definitions of Energy** The term "heat" as used in everyday language refers both to thermal motion (the motion of atoms or molecules within a substance) and radiation(particularly infrared and light).In science, heat is used only for this second meaning; it refers to energy transferred when two objects or systems are at different temperatures.(secondary to MS-PS1-4) Temperature is not a measure of energy; the relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present (secondary to MS-PS1-4.) **ETS1.B: Developing Possible Solutions** A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.(secondary to MS-PS1-6) **ETS1.C: Optimizing the Design Solution** Although one design may not perform the best across all tests,

	identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of the characteristics may be incorporated into the new design (secondary to MS-PS1-6.) The interactive process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (secondary to MS-PS1-6)
Unit 3: Structure and Function & Information Processing	**Unit 4: Matter & Energy in Everyday Life**
LS1.A:Structure and Function All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular)or many different numbers and types of cells (multicellular).(MS-LS1-1) Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell.(MS-LS1-2) In multicellular organisms, the body are a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.(MS-LS1-3) **LS1.D:Information Processing** Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)	**LS1.C:Organization for Matter and Energy Flow in Organisms** 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. These sugars can be used immediately or stored for growth or later use.(MS-LS1-6) Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7) **PS3.D: Energy in Chemical Processes and Everyday Life** The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen.(secondary to MS-LS1-6)

	Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)
Unit 5: Growth and Development of Organisms	**Unit 6: Inheritance & Variation of Traits**
LS1.B: Growth and Development of Organisms Animals engage in characteristic behaviors that increase the odds of reproduction.(MS-LS1-4) Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction.(MS-LS1-4) Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5) **LS1.B: Growth and Development of Organisms** Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.(secondary to MS-LS3-2)	**LS3.A:Inheritance of Traits** 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 affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1) Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited.(MS-LS3-2) **LS3.B:Variation of Traits** 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. (MS-LS3-2) In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1) **LS4.B: Natural Selection**

	Natural selection leads to the predominance of certain traits in a population, and the suppression of others.**(**MS-LS4-4**)** In *artificial* selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed onto offspring. (MS-LS4-5) **LS4.C: Adaptation** Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes.(MS-LS4-6)
Unit 7: Natural Resources & Human Impact	**Unit 8: Global Climate Change**
ESS3.A:Natural Resources Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, freshwater, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.(MS-ESS3-1) **ESS3.C:Human Impacts on Earth Systems** Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things.(MS-ESS3-3) Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on	**ESS3.D: Global Climate Change** Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)

Earth unless the activities and technologies involved are engineered otherwise. (MS- ESS3-3),(MS-ESS3-4)	

Unit Lesson Plan – Matter and Its Properties			
Teacher:	**SBOE Faculty**	**Time Frame:**	17 days (depending on individual teacher schedule)
Grade:	**7th Grade**	**School:**	Middle School
Subject:	**Middle School Science**		
NJSLS/DCI **MS-PS1-A: Structures and Properties of Matter**	**Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.(MS-PS1-1)** **Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.(MS-PS1-2),(MS-PS1-3)** **Gases and liquids are made of molecules or inert atoms that are moving about relative to each other.(MS-PS1-4)** **In a liquid, the molecules are constantly in contact with others;** **In a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.(MS-PS1-4)** **Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).(MS-PS1-1)** **The changes of state that occur with variations in temperature or pressure can be described and predicted using these models matter.(MS-PS1-4)** http://www.nextgenscience.org/msps1-matter-interactions		

Instructional Objective: MS-PS1-1.	**Develop models to describe the atomic composition of simple molecules and extended structures**
Instructional Objective: MS-PS1-2.	**Analyze and interpret data on the properties of substances**
Instructional Objective: 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**

Essential Questions

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

1. What is matter and how do we measure it?
2. What is an atom and how is it structured?
3. How is the Periodic Table of Elements arranged and what does an element's placement tell you about the substance?
4. What is the difference between a physical and a chemical property and what are some examples of each?
5. What are the states of matter and what role does thermal energy play in changing matter's state?

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:
● Everything in the universe is made of matter. ● Elements are composed of atoms which are simple substances that can't be broken down into other substances. ● How the Periodic Table is arranged. ● Molecules are combinations of various elements that result in brand new substances. ● Examples of physical and chemical properties of matter and the difference between the two groups. ● How to calculate using the density formula.	● Describe the basic structures of atoms and molecules ● Demonstrate how both mass and volume are measured and then use this information to calculate for density. ● Distinguish between weight and mass. ● Describe the difference between physical and chemical properties and give examples of each. ● Display the ability to read the Periodic Table of Elements and describe elements based on their location in the chart. ● Distinguish between solids, liquids and gases based on distinct characteristics

• Characteristics of solids, liquids and gases and that thermal energy is responsible for the changes of phases of matter.	

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 embedded questions within the lesson. 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.

Lab 1 – Measuring Matter
Lab 2 – Build an Atom
Quiz 1 – Matter and Periodic Table Quiz
Lab 3 – Build a Molecule
Quiz 2 – Physical Properties of Matter / Molecules
Lab 4 – Determining Density
Quiz 3 – Density
Quiz 4 – States of Matter / Changes of Matter
Unit Test

Suggested Sequence

Day	Topic	Class Work	Homework

1	What is Matter?	Slides 1-26; Questions #1-3	Questions #4-8
2	How Do We Measure Matter?	Slides 27-42; Questions #9-11	Questions #12-16
3	Lab: Measuring Matter	Slide 43; Lab Worksheet	Finish Lab
4	Elements of the Periodic Table	Slides 44-57; Questions #17-22	Questions #23-31
5	Lab: Build an Atom	Slide 58	Finish Lab Study for quiz
6	Matter & Periodic Table; Physical Properties of Matter / Compounds and Molecules	Matter & Periodic Table Quiz Slides 59-80	N/A
7	Physical Properties of Matter / Compounds and Molecules	Slides 81-90; Questions #32-34	Questions #35-43
8	Lab: Build a Molecule	Slide 91; Lab Worksheet	Finish Lab Study for quiz

9	Physical Properties of Matter / Molecules Quiz; Density	Physical Properties of Matter Quiz; Slides 92-106; Question #44	Questions #49-51
10	Density	Slide 107; Density Column Demo; Will It Float Demo; Questions #45-48	Questions #52-55
11	Lab: Determining Density	Slide 108; Lab Worksheet	Finish Lab Study for quiz
12	Density; States of Matter	Density Quiz; Slides 109-131	N/A
13	States of Matter	Slide 132 Questions #56-59	Venn Diagram
14	Changes of State	Slides 133-166; Questions #60-65	Questions #66-75
15	States of Matter; Chemical Properties of Matter	States of Matter Quiz Slides 167-173; Questions #76-77	Questions #78-86
16	Test Review	Study Guide	Study Guide
17	Test		N/A

**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.
***Pacing guides are based on 40 minute periods, you may need to adapt based on your school's schedule.

Unit Lesson Plan Chemical Reactions and Energy			
Teacher:	SBOE Faculty	**Time Frame:**	20 days (depending on individual teacher schedule)
Grade:	**7th Grade**	**School:**	Middle School
Subject:	**Middle School Science**		
NJSLS/DCI **MS-PS1-B: Chemical Reactions** **MS-PS3-A: Definitions of Energy**	**Substances react chemically in characteristic ways. In a chemical process, the atoms that makeup the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.(MS-PS12),(MS-PS1-3),(MS-PS1-5)** **The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5)** **Some chemical reactions release energy, others store energy. (MS-PS1-6)** **The term "heat" as used in everyday language refers both to thermal motion (the motion of atoms or molecules within a substance) and radiation (particularly infrared and light). In science, heat is used only for this second meaning ;it refers to energy transferred when two objects or systems are at different temperatures.(secondary to MS-PS1-4)** **The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecules (whichever is the appropriate building block for the system's material). The details of that relationship 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**		

ETS1.B: Developing Possible Solutions **ETS1.C: Optimizing the Design Solution**	**called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material. (secondary to MS-PS1-4)** **A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.(secondary to MS-PS1-6)** **Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of the characteristics may be incorporated into the new design.(secondary to MS-PS1-6)** **The interactive process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (secondary to MS-PS1-6)** http://www.nextgenscience.org/msps1-matter-interactions
Instructional Objective: 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.**
Instructional Objective: MS-PS1-3.	**Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.**
Instructional Objective: 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.**
Instructional Objective: 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.**
Instructional Objective: MS-PS1-6.	**Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.**
Essential Questions	
(What questions will the student be able to answer as a result of the instruction?)	

6. What happens when substances react chemically?
7. What happens to atoms of the original substances when a reaction occurs?
8. Will the properties of the substance that is produced as part of a reaction be the same as those of the original substances?
9. What happens to the total mass of all atoms as a reaction takes place?
10. How does the amount of stored energy change during a chemical reaction?
11. How does the everyday definition of "heat" differ from the scientific definition?
12. When does heat transfer between two objects?
13. How are temperature and energy related?

Knowledge & Skills	
(What skills are needed to achieve the desired results?)	
By the end of this unit, students will know: ● How to determine if a chemical reaction has occurred. ● How atoms can rearrange and combine to form new substances. ● Key, easily observable properties of chemical substances ● That properties of substances may change during a chemical reaction. ● That total mass in a reaction must be conserved ● That some reactions can absorb energy ● That some reactions can release energy ● That heat is transferred from an object at higher temperature to an object at lower temperature. ● That heat transfer stops when the objects	By the end of this unit, students will be able to: ● Describe observable cues that a chemical reaction has occurred. ● Distinguish between chemical substances based on observable properties. ● Develop an atomic level model to explain how atoms rearrange to form new substances during a chemical reaction. ● Distinguish between reactions that absorb energy and reactions that release energy ● Explain when heat will transfer between two objects and in which direction the heat will flow.

reach the same temperature.	

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 embedded questions within the lesson. 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.

Preview Assignment: Students will be asked to complete Homework Assignment 1: Things You Already Know by the first day of the unit. It can serve as a classwork assignment for students finishing the Unit 1 test before time is complete while classmates continue to work, may be given as an in class activity, or as a homework assignment. This assignment is meant to give the teacher an idea of whether or not students are prepared for the information to be covered in Unit 2.

Lab 1 Classifying Reactions

Quiz 1 Physical and Chemical Changes

Lab 2 Atomic Rearrangement

Quiz 2 Conservation of Mass

Quiz 3 Types of Energy and Energy Changes

Lab 3 Temperature and Thermal Energy

Lab 4 Energy Transfer

Quiz 4: Thermal Energy and Temperature

Unit 2 Test

Suggested Sequence of Topic and Daily Activities

Day	Topic	Classwork	Homework
1	Unit Preview	Unit Preview Classwork	Finish Preview
2	Changes and Signals	Slides 4-21 Signals of Changes Classwork	Finish Classwork
3	Physical Change vs Chemical Reaction	Slides 22-34 Classifying Physical Changes and Chemical Reactions Classwork	Finish Classwork
4-5	Identifying Changes	Slide 35 Lab 1: Classifying Reactions	Finish Lab Questions Study for Quiz
6	Physical and Chemical Changes; Conservation of Mass	Quiz #1 Slides 36-39 Conservation of Mass Classwork	Conservation of Mass HW

7	Conservation of Mass	Slides 40-62 Balancing Equations Classwork	Balancing Equations HW
8-9	Conservation of Mass	Slide 63 Lab 2: Atomic Rearrangement	Finish Lab 2 Questions Study for Quiz
10	Conservation of Mass; Types of Energy	Quiz #2 Slides 64-76 Types of Energy Classwork	Types of Energy HW
11	Energy Changes During Reactions	Slides 77-91 Energy Changes Classwork	Energy Changes HW Study for Quiz
12	Energy Types and Energy Changes; Temperature and Thermal Energy	Quiz 3 Slides 92-104 Temperature and Thermal Energy Classwork	Temperature and Thermal Energy HW
13	Energy Flow	Slides 105-114 Energy Flow Classwork	Energy Flow HW Complete Hypothesis Starters for Temperature & Thermal Energy Lab
14	Temperature and Thermal Energy & Energy Flow	Lab 3: Temperature and Thermal Energy	Finish Lab 3 Questions

15-17	Temperature and Thermal Energy & Energy Flow	Lab 4: Energy Transfer	Study for Quiz
18	Quiz #4: Thermal Energy and Temperature	Quiz #4 Slides 117-119 Study Guide	Study Guide
19	Review	Unit Review	Study for Test
20	Unit Test	Unit Test	N/A

*NOTE TO TEACHER: Lab 3 should be introduced after Energy Transfer has been discussed in class because it relies on some of the Energy Transfer concepts such as energy flow to illustrate the difference between thermal energy and temperature.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.
***Unit Pacing guidelines are based on 40 minute periods, the teacher may need to adjust based on the school's schedule.

Unit Lesson Plan – Structure and Function & Information Processing			
Teacher:	**SBOE Faculty**	**Time Frame:**	20 days (depending on individual teacher schedule)
Grade:	**7**	**School:**	Middle School
Subject:	**Middle School Science**		
NJSLS/DCI **MS-LS1.A: Structures and Function** **MS-LS1.D: Information Processing**	**All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1)** **Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2)** **In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3)** **Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)** http://www.nextgenscience.org/msls1-molecules-organisms-structures-processes		
Instructional Objective: MS-LS1-1.	**Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different types of cells.**		

Instructional Objective: MS-LS1-2.	**Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute of the function.**
Instructional Objective: MS-LS1-3.	**Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.**
Instructional Objective: 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.**

Essential Questions
(What questions will the student be able to answer as a result of the instruction?)
14. What are the building blocks of life? 15. How does each part of a cell function? 16. How is the body a system of interacting subsystems composed of groups of cells? 17. What are fundamental differences between animal and plant cells pertaining to cell reproduction? 18. How do our sensory receptors send information to our brain?

Knowledge & Skills	
(What skills are needed to achieve the desired results?)	
By the end of this unit, students will know: ● All living things are made up of cells, which is the smallest unit that can be said to be alive. ● An organism may consist of one single cell (unicellular) or many different numbers and	By the end of this unit, students will be able to: ● Determine whether something is living or nonliving ● Explain how cells are the building blocks of life ● Build models of both a plant and animal cell and be able to demonstrate key

types of cells (multicellular). ● Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. ● In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. ● Cells form tissues, which form organs, which form systems ● Sensory receptors send messages to our brain	characteristics that define both ● Describe how multicellular subsystems interact and work together to form tissue and organs that are specialized to particular body functions. ● Explain the similarities and differences between a chicken wing and a human arm ● Explain how our brain receives messages

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 embedded questions within the lesson. 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.

Lab 1: Investigating Cells

Quiz 1: Cell Structure and Function

Project: Cell City

Build an Organ Activity

Lab 2: Dissecting a Chicken Wing

Organ Systems Activity

Quiz 2: Tissues, Organs & Organ Systems

Lab 3: Can You Trust Your Senses?

Quiz 3: Information Processing

Unit Test

Suggested Sequence of Topic and Daily Activities

Day	Topic	Classwork	Homework
1	Characteristics of Living Things & Cell Theory	Slides 1-18; Classwork #1-4	Homework #6-9
2	Eukaryotes vs Prokaryotes	Slides 19-31; Classwork #5; Read over Lab 1	Homework #10
3	Microscope Lab	Intro to Microscopes Lab Notebook, Lab 1: Investigating Cells (Part 1-2)	

4	Cell Structure & Function	Slides 33-54	
5	Cell Structure & Function	Slides 54-63; Classwork #11-13	Organelle Chart
6	Microscope Lab	Lab 1:Investigating Cells (Part 3-5)	Complete Lab Questions and Conclusion Study for Quiz
7	Cell Structure & Function	Quiz 1; Assign Cell City Project and due date	Cell City Project
8	Tissues	Slide 66-79: Classwork #14-21	Complete Questions 14-21 if needed
9	Organs	Slide 80; Build an Organ Activity	
10	Dissecting a Chicken Wing Lab	Lab 2: Dissecting a Chicken Wing	Complete lab questions
11	Organs & Organ Systems	Slides 82-91; Questions Tissues, Organs & Organ System Class Work Flow Chart	Questions 22-31
12	Organs & Organ Systems	Organ Systems Activity (Part I)	

13	Organs & Organ Systems	Organ Systems Activity (Part II)	Study for Quiz
14	Information Processing	Quiz 2; Slides 93-100	
15	Information Processing	Slides 101-111, Classwork #32-36	Homework #37-42
16	Can You Trust Your Senses Lab	Lab 3: Can you trust your senses?	Complete Lab Questions Study for Quiz
17	Information Processing	Quiz 3; Prepare for Cell City presentations	Cell City Project
18	Cell City Presentations	Presentations	Study Guide
19	Unit Review	Review Study Guide	Study for Test
20	Unit Test		

*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 and labs are currently tiered / differentiated to accommodate the variety of diverse learning needs in each class. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.

***Pacing guide is based on 40 minute class periods, you may need to adjust based on your school's schedule.

Unit Lesson Plan – Matter & Energy in Everyday Life			
Teacher:	**SBOE Faculty**	**Time Frame:**	**15 days (depending on individual teacher schedule)**
Grade:	**7**	**School:**	Middle School
Subject:	**Middle School Science**		
NJSLS/DCI: **LS1.C: Organization for Matter and Energy Flow in Organisms** **PS3.D: Energy in Chemical Processes and Everyday Life**	**Plant, algae (including phytoplankton), and many microorganisms use energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6)** **Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth or to release energy. (MS-LS1-7)** **The chemical reactions by which plants produce complex food molecules (sugars) requires energy input (i.e., from sunlight) to occur. In this reaction carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary to MS-LS1-6)** **Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (MS-LS1-7)** http://www.nextgenscience.org/msls1-molecules-organisms-structures-processes		
Instructional Objective: 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.**		
Instructional Objective:	**Develop a model to describe how food is rearranged through chemical reactions to forming**		

MS-LS1-7.	new molecules that support growth and/or release energy as this matter moves through an organism.

Essential Questions

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

19. What is photosynthesis?
20. Why is photosynthesis important to all living things?
21. Where is the energy needed to perform photosynthesis created?
22. In what organisms does photosynthesis occur? In what cell structures does photosynthesis occur?
23. What is cellular respiration?
24. What materials are needed to perform photosynthesis? Cellular Respiration?
25. What materials are produced by photosynthesis? Cellular Respiration?
26. In what organisms does respiration occur? In what cell structures does respiration occur?
27. What is the relationship between Photosynthesis and Cellular Respiration?

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:
Photosynthesis uses carbon dioxide and water to store the energy of water in plants. It creates glucose and releases oxygen as a waste product. Photosynthesis gets its energy from the sun and occurs in the chloroplast of plants. Cellular respiration is the opposite of Photosynthesis. It releases the energy stored in glucose by combining it with oxygen to give off	● Model the processes of Photosynthesis and Cellular Respiration ● Explain that the energy to power photosynthesis comes from the sun. ● Construct a scientific explanation based on evidence for the role of photosynthesis in cycling matter and flow of energy in 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.

energy and releases carbon dioxide and water as waste products. This occurs in the mitochondria. These two cycles are a system that helps keep many organisms on Earth alive.	

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 embedded questions within the lesson. 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: Photosynthesis

Lab 1: Investigating Photosynthesis Inquiry Lab

Lab 2: Set Sail for the Island of Photosynthesis

Activity 1: Cellular Respiration Molecular Model Activity

Project 1: Photosynthesis and Cellular Respiration Project

Quiz 2: Cellular Respiration

Unit Test

Suggested Sequence of Topics and Daily Activities

Day	Topic	Classwork	Homework

1-2	Photosynthesis	Slides 2-10; Lab 1: Investigating Photosynthesis Inquiry Lab	Lab Questions
3	Photosynthesis	Slides 11-23; Classwork 1-6	Homework 7-13
4	Photosynthesis	Slides 24-25; Photosynthesis Game	N/A
5	Photosynthesis	Slides 26-27; Lab 2: Set Sail for the Island of Photosynthesis (part 1)	Complete Part 1 of Lab 2 and plan for diorama- bring in any necessary supplies
6	Photosynthesis	Lab 2: Set Sail for the Island of Photosynthesis (part 2)	Complete diorama & prepare for presentation
7	Photosynthesis	Diorama Presentations	Complete Reflection Sheet in Lab 2
8	Photosynthesis; Cellular Respiration	Quiz 1; Slides 28-34	N/A
9	Cellular Respiration	Slide 35; Activity 1: Cellular Respiration Molecular	Finish Activity Questions

		Model Activity	
10	Cellular Respiration	Slides 36-39; Classwork 14-19; Assign Project: Photosynthesis and Cellular Respiration Project	Work on Project
11	Energy and Matter Flow	Slides 40-44; Work on Project	Homework 20-24; Work on Project
12	Energy and Matter Flow	Work on Project	Study for quiz
13	Cellular Respiration	Quiz 2; Prepare for presentations	Prepare for presentations
14	Energy and Matter Flow in Photosynthesis and Cellular Respiration	Project Presentations; Study Guide	Study for test
15	Unit Test	Unit Test	

**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.
***Pacing guides are based on 40 minute periods, you may need to adapt based on your school's schedule.

Unit Lesson Plan – Growth and Development of Organisms			
Teacher:	SBOE Faculty	**Time Frame:**	19 days (depending on individual teacher schedule)
Grade:	**7**	**School:**	Middle School
Subject:	**Middle School Science**		
NJSLS DCI: **LS1.B: Growth and Development of Organisms**	**Animals engage in characteristic behaviors that increase the odds of reproduction (MS-LS1-4)** **Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction (MS-LS1-4)** **Genetic factors as well as local conditions affect the growth of the adult plant (MS-LS1-5)** **Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring (secondary to MS-LS3-2)** http://www.nextgenscience.org/msls1-molecules-organisms-structures-processes http://www.nextgenscience.org/msls3-heredity-inheritance-variation-traits		
Instructional Objective: **MS-LS1-3.**	**Use an argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants**		
Instructional Objective: **MS-LS1-5.**	**Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms**		
Instructional Objective: **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

Essential Questions
(What questions will the student be able to answer as a result of the instruction?)
1. How do organisms reproduce? 2. What is the difference between sexual and asexual reproduction? 3. How can an organism's behavior increase its chance of survival and reproduction? 4. What structures or mechanisms aid in plant reproduction? 5. How does the environment contribute to successful reproduction or growth? 6. How do genetic factors influence the growth of organisms? 7. How do natural differences in organisms increase survival and reproduction?

Knowledge & Skills	
(What skills are needed to achieve the desired results?)	
By the end of this unit, students will know: ● The stages of mitosis ● Simple meiosis ● Land and aquatic fertilization strategies ● Asexual and sexual reproduction ● How behavior affects survival and reproduction ● Animal parenting methods ● Flower structure ● How the environment affects growth and	By the end of this unit, students will be able to: ● Show the order of mitosis given pictures, name the function of mitotic structures ● Differentiate between animal types and reproductive strategies ● Identify extreme structures for attracting mates ● Identify behaviors which enhance reproductive success ● Differentiate between aquatic and land fertilization and development of young ● Compare parenting styles of animals ● Compare pollination types ● Dissect and identify flower structures and function

reproduction ● Reproductive success is measured in the number of offspring which survive to reproduce	● Distinguish between different types of pollen ● Compare fruits, nuts and seeds ● Identify environmental effects on growth ● Argue the importance of nurture vs. nature

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 embedded questions within the lesson. 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: Cell Division

Lab 1: Yeast Budding

Lab 2: Vegetative Propagation

Quiz 2: Reproduction

Quiz 3: Animal Behavior & Reproduction

Lab 3: Pollen Observations

Lab 4: Flower Dissection

Quiz 4: Plant Reproduction

Unit Test

Suggested Sequence of Topics and Daily Activities

Day	Topic	Classwork	Homework
1-2	Review Cell Theory; Mitosis	Slides 1-29 Questions #1-4	Questions #5-7 Study for Quiz
3	Quiz	Cell Division Quiz	
4	Asexual Reproduction	Slides 30-48 Questions #8	Questions #9-13
5	Lab	Yeast Budding Lab	Complete lab questions
6	Lab	Vegetative Propagation Lab	Complete lab questions

7	Sexual Reproduction, Meiosis	Slides 49- 60 Questions #14-15	Questions #16, 17 Study for Quiz
8	Quiz	Reproduction Quiz	
9	Reproductive Strategies: r-selected & k-selected species	Slides 61 – 75 Questions #18 - 21	Questions # 22-23
10	Fertilization & Offspring	Slides 76-91 Questions #24,25	Questions # 26, 27 Study for Quiz
10	Quiz	Animal Behavior & Reproduction Quiz	
11	Plant Structures and Pollination	Slides 92–110 Questions #29 - 30	Questions # 31-32
12	Seed Formation and Dispersal	Slides 113-131 Questions # 33-34	Question # 35
13	Lab	Pollen Observations Lab	Complete lab questions
14	Lab	Flower Dissection Lab	Complete lab questions Study for Quiz
15	Quiz	Plant Structures & Reproduction	

16-17	Environmental and Genetic Factors	Slides 132-157 Questions # 36-38	Questions # 39-46 Study Guide
18	Unit Test Review	Review Study Guide	Study for Test
19	Unit Test		

**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.
***Pacing guides are based on 40 minute periods, you may need to adapt based on your school's schedule.

Unit Lesson Plan – Inheritance and Variation of Traits			
Teacher:	SBOE Faculty	**Time Frame:**	27-28 days (depending on individual teacher schedule)
Grade:	**7**	**School:**	Middle School
Subject:	**Middle School Science**		
NJSLS DCI: **MS-LS1.B: Growth and Development of Organisms** **MS-LS3.A:Inheritance of Traits** **MS-LS3.B:Variation of Traits**	**Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.(secondary to MS-LS3-2)** **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 affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1)** **Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes)inherited.(MS-LS3-2)** **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. (MS-LS3-2)** **In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to**		

	the organism. (MS-LS3-1) http://www.nextgenscience.org/msls3-heredity-inheritance-variation-traits
Instructional Objective: 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.**
Instructional Objective: 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.**

Essential Questions	
(What questions will the student be able to answer as a result of the instruction?)	
28. How do children get traits from their parents? 29. Why do some people look more like their dad and some look more like their mom? 30. What is a Punnett Square and how does it help us predict the traits of offspring? 31. Why do some children show traits that neither of their parents display? 32. Why are some people born with birth defects or diseases?	
Knowledge & Skills	
(What skills are needed to achieve the desired results?)	
By the end of this unit, students will know: ● How to properly use a Punnett Square ● Your traits are determined by the dominant and recessive alleles passed to you from your parents ● The difference between genotype and phenotype and how phenotype depends on genotype	By the end of this unit, students will be able to: ● SWBAT properly complete a Punnett Square and use it to predict the genes of offspring ● SWBAT use an organism's genotype to describe the physical characteristics of the object ● SWBAT properly perform test crosses to determine an unknown genotype ● SWBAT demonstrate appropriate research skills and teach the class about birth defects and genetic mutations

• How to perform a testcross to determine the unknown genotype of an organism • Why a person may end up being born with a birth defect or disease	

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 embedded questions within the lesson. 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.

Web quest – Mendel's Peas
Activity – Dragon Crossing (Punnett Squares)
Activity – Jane and John (Using Punnett Squares)
Quiz 1 – Mendelian Genetics and Punnett Squares
Project – Genetic Mutations (see rubric)
Unit Test

Suggested Sequence of Topics and Daily Activities

Day	Topic	Classwork	Homework
1	Introduction and Review of Meiosis/Mitosis Slides 1-13	#1-3	#9-11

2	Gregor Mendel and His Experiments Slides 14-25	#4-6	#12-13
3-4	Mendel's Peas Webquest Slide 26	Web quest	Finish webquest (if needed)
5	Mendel's Results / Alleles Slides 27-37	#7-8	#14
6	Using Punnett Squares Intro / The Counting Principle Slides 38-47	#15-16	#24-26
7	Setting Up the Punnett Square / Genotype v Phenotype Slides 48-56	#17-19	N/A
8-9	Dragon Crossing Activity Slide 57	Activity	Finish activity (if needed)
10** Potentially could stretch	Mendel's Experiments Slides 58-73	#20-23	#27-29

2 days			
11-12	Jane and John Activity Slide 74	Activity	Finish activity (if needed)
13	Mendel / Punnett Square Quiz	Quiz	N/A
14-16	Test Crosses Slides 75-87	Test Cross Classwork worksheet	Test Cross Homework worksheet
17	Testcross Activity Slide 88	Testcross Student WKST	Finish for HW (if needed)
18-19	Genetic Mutations Slides 89-113	#30-34	#35-40
20-23	Genetic Disorders Baby Project Class time to work on project (amount of days is up to teacher's discretion)	Work on Baby Project with partner	Project
24-26	Presentation of Genetic Disorder Projects	Presentations	N/A

27	Unit Test	Test	N/A

**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.

Unit Lesson Plan: Natural Resources and Human Impact			
Teacher:	SBOE Faculty	**Time Frame:**	25 days (depending on individual teacher schedule)
Grade:	**7th Grade**	**School:**	Middle School
Subject:	**Middle School Science**		
NJSLS/DCI: **MS-ESS3.A: Natural Resources** **ESS3.C: Human Impacts on Earth Systems**	**Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)** **Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3)** **Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS- ESS3-3),(MS-ESS3-4)** http://www.nextgenscience.org/msess3-earth-human-activity		
Instructional Objective: MS-ESS3-1	**Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.**		

Instructional Objective: MS-ESS3-3	**Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.**
Instructional Objective: MS-ESS3-4	**Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.**

Essential Questions

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

1. What is a natural resource?
2. What makes a natural resource renewable? Non-renewable?
3. Where do natural resources come from?
4. How are natural resources used in society? What are some examples?
5. Why does the distribution of natural resources vary across the globe?
6. Is there a correlation between natural resource consumption and population growth?
7. Can a renewable resource ever be depleted?
8. What impacts do humans have on Earth's environment when we gather and use natural resources?
9. What is the relationship between ecological footprint per capita, human population growth, economic income and changes in biodiversity?
10. Why is an ecological overshoot harmful to the planet?
11. What does it mean to be sustainable?
12. What are some examples of sustainable activities and technologies?
13. How does sustainability benefit both people and the planet?
14. Is being sustainable an individual effort or a global effort? Why?

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:

● Sources of natural resources in terms of the atmosphere, lithosphere, hydrosphere and biosphere ● How humans use natural resources ● Specific examples of natural resources and their uses ● The distribution of natural resources on the planet varies due to different geological processes ● Changes in population affect natural resource consumption and Earth's environment. ● The major impacts on Earth's environment that occur due to natural resource consumption. ● How humans contribute to ecological footprint per capita ● The relationship between biodiversity, human population growth, ecological footprint per capita and economic income of a given population ● Why ecological overshoot is not sustainable in the long term ● The definition and requirement for sustainability ● Examples of sustainable actions that individual and society as a whole can take	● Define natural resources ● Identify forms of natural resources and distinguish between each in terms of their source. ● Describe how natural resources play a role in society ● Explain how the distribution of various natural resources were shaped by past and current geological processes ● Describe how the population has changed in the last several decades and what impact this has on natural resource consumption and the Earth's environment. ● Identify and describe specific impacts of human natural resource consumption. Including land depletion through deforestation and agriculture, depletion of aquifers, pollution of land and air via mining, agriculture and burning of fossil fuels and global warming from deforestation and fossil fuel burning. ● Explain how the rate of change in ecological footprint is related to the rate of change in population growth and a country's economic income. ● Describe how the planet's biodiversity is linked to human population and ecological footprint per capita. ● Explain why long term ecological overshoot is detrimental to the planet and its inhabitants. ● Describe what actions people in a society can take to lessen ecological overshoot. ● Describe sustainable actions/technologies and identify how it benefits the planet

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 embedded questions within the lesson. 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: Natural Resources Quiz 2: Distribution and Consumption Quiz 3: Human Impact Natural Resource Activity Mapping Our Human Footprint Activity Sustainable Solutions for Cities Project Minimizing Human Impact Research Project Unit Test			
Suggested Sequence of Topics and Daily Activities			
Day	**Topic**	**Classwork**	**Homework**
1	Natural Resources	Slides 1-13	Complete “Where Did It Come From”

		Where Did It Come From?	
2	Natural Resources	Slides 14-33	HW #1-8
3	Renewable vs Nonrenewable Resources	Slides 34-40 Classwork #9	HW #15-16, 20
4-5	Natural Resources Quiz Natural Resource Distribution	Slides 41-46 Distribution of Natural Resources Classwork #10-14	HW #17-19
6-7	Geological processes	Slides 47-67 Classwork #21-24	HW #25-29
8-9	Distribution and Consumption Quiz Human Impact – Deforestation Great Kapok Tree	Slides 66-82 Classwork #30-31	HW #34

10-12	Human Impact – Water, Mining and Fossil Fuels	Slides 83-106 Classwork #32-33 Positive Impacts of Human Influences on Earth	HW #35-37
13	Reducing our Ecological Footprint	Natural Resource Activity Part 1	Complete activity
14	Reducing our Ecological Footprint	Natural Resource Activity Part 2	Complete activity
15-16	Reducing Our Ecological Footprint	Mapping Our Human Footprint Activity Slides 107-119	Finish activity
17-20	Human Impact Quiz Sustainability	Slides 120-126 Sustainable Solutions for Cities Project	Work on project
21-23	Monitoring and Minimizing Human Impact	Minimizing Human Impact Research project	Work on project

24	Review	Study Guide	Study for test
25	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. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.

Unit Lesson Plan Global Climate Change			
Teacher:	SBOE Faculty	**Time Frame:**	21 days (depending on individual teacher schedule)
Grade:	**7th Grade**	**School:**	Middle School
Subject:	**Middle School Science**		
NJSLS/DCI: **ESS3.D: Global Climate Change**	Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)		
Instructional Objective MS-ESS3-5	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.		

Essential Questions

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

15. What is climate and how does it compare to weather?
16. What are temperature anomalies and what does this mean in terms of climate?
17. What causes the climate and weather on Earth?
18. What is the difference between longwave and shortwave radiation and how do they impact the Earth's atmosphere?
19. What causes global climate change?
20. How does global climate change impact society?
21. How do scientists know what the past climate was like?
22. What are some technologies and behaviors that will help to reduce climate change?

Knowledge & Skills	
(What skills are needed to achieve the desired results?)	
By the end of this unit, students will know: ● The difference between climate and weather ● How to interpret graphs of long term climate data ● That the greenhouse effect is responsible for making our planet habitable ● How an enhanced greenhouse effect occurs ● That the greenhouse gases most influential to climate change and rising temperatures are caused by burning fossil fuels ● The difference between anthropogenic and natural causes of climate change ● That carbon dioxide is the greenhouse gas that humans emit the most of through electricity production and transportation ● The major impacts of global climate change ● How climate scientists obtain historical records of our atmosphere ● The role of the Intergovernmental Panel on Climate Change (IPCC) in global climate change ● The difference between mitigation and adaptation strategies as they relate to climate change	By the end of this unit, students will be able to: ● Identify examples of climate versus weather ● Distinguish climate from weather using scenarios and graphs ● Describe what happens to incoming solar radiation once it reaches Earth's atmosphere? ● Identify greenhouse gases and their role in climate change ● Identify and describe anthropogenic sources of climate change ● Identify and describe natural sources of climate change ● Relate the cause and effects of climate change impacts. ● Describe the role of ice cores in climate science. ● Explain the function of the IPCC versus governmental policy makers. ● Describe specific examples of mitigation and adaptation strategies in different governmental sectors (i.e. human health, ecosystems, etc.) in the face of climate change

• Technologies and behaviors that can be used or implemented to reduce the rate at which climate change is happening	

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 the embedded questions within the lesson. . 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.

Lab 1: The Greenhouse Effect Model

Quiz 1: Climate and Greenhouse Effect

Quiz 2: Causes of Climate Change

Lab 2: Analyzing an Ice Core

Quiz 3: Climate Change Impacts

Project: Be Part of the Solution

Quiz 4: Reducing Climate Change

Unit Test

Suggested Sequence of Topics and Daily Activities			
Day	**Topic**	**Classwork**	**Homework**
1	Climate vs. Weather	Slides 1-16 CW1: Understanding Climate Graphs	HW1: Climate and Weather for your city
2	Climate vs. Weather The Greenhouse Effect	CW2: Weather or Climate? (warmup) Slides 17-37	HW2: The Greenhouse Effect Review Sheet
3	The Greenhouse Effect	Lab 1: The Greenhouse Effect Model	HW3 Concept Map Activity (Start w/ terms in Chunk 1) Study for Quiz
4	Climate Change	QUIZ 1 Slides 38-44 (goes with CW 3: Is Global Climate Change Occurring)	Continue HW3: Concept Map (Complete terms in Chunk 1)
5	Anthropogenic Causes of Climate Change	Slides 45-51 CW 4: Human Sources of greenhouse gases	HW4: Do you contribute to climate change?

		****Note: Prepare ice cores for ice core activity (see day 11)**	
6	Anthropogenic Causes of Climate Change	CW: student group share session with HW3 assignment Slides 52-62	Continue HW3: Concept Map (Complete terms in Chunk 2)
7	Natural Causes of Climate Change	Slides 63-77 CW5: Manmade or natural climate change? (including slide 77)	Continue HW3: Concept Map (Complete terms in Chunk 3) Study for Quiz
8	Causes of Climate Change/Impacts of Climate Change	QUIZ 2 Slides 78-92 CW6: Climate Change, Cause and Effect (have students start on Part I as you go over the slides)	
9	Impacts of Climate change	Slides 93-98 Continue CW6: Climate Change, Cause and	Continue HW3: Concept Map (Start working on terms in Chunk 4)

		Effect (have students finish Part I as you go over the rest of the slides) Continue CW6: Climate Change, Cause and Effect (students work on Part II and Part III in groups)	
10	Impacts of Climate change	Allow students to finish group work from yesterday and present global climate change skits. Summarize with Slide 99-105	Continue HW3: Concept Map (Finish terms in Chunk 4)
11	Understanding Climate change	Slides 106-115 Lab 2: Analyzing an ice core	Continue HW3: Concept Map (Start terms in Chunk 5)

12	Understanding Climate change	Slides 116-122 Students work on Concept map (chunk 5)	Continue HW3: Concept Map (Finish terms in Chunk 5)
13	Reducing Climate Change/Mitigation and Adaptation	QUIZ 3 Slides 123-133	
14	Reducing Climate Change/Mitigation	Slides 134-136 Students complete Part I of "Be Part of the Solution Project"	Students work on "Be Part of the Solution Activity" Part II-IV
15	Reducing Climate Change/Mitigation and Technology	Slides 137-152 Students work on Concept map (chunk 6)	Students work on "Be Part of the Solution Activity" Part II-IV
16	Dealing with climate change/Adaptation	Slides 153-155 CW7: Adaptation Strategies	Students work on "Be Part of the Solution Activity" Part II-IV

17	Dealing with climate change/Adaptation	Slides 156-161 Students finish Adaptation Strategies Activity from yesterday if needed AND Complete concept map	Students work on "Be Part of the Solution Activity" Part II-IV
18	Dealing with climate change/Adaptation	Quiz 4 Can allow students to work on project or go over old quizzes to start review	Students FINISH "Be Part of the Solution Activity" Part II-IV
19 (optional)	Reducing Climate Change	Students present	Give Students study guide to start
20	Unit Review	Study Guide/Review	Study
21	TEST	TEST	

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