Pine Hill Public Schools Curriculum			
Content Area:	Science		
Course Title/ Grade Level:	Gifted and Talented STEAM Grade 6		
Unit 1:	What is STEAM?	Duration:	3 weeks
Unit 2:	Aquaponics Introduction	Duration:	1 week
Unit 3:	Interdependent Relationships in Ecosystems/Matter and Energy in Organisms	Duration:	8 weeks
Unit 4:	Structure, Function, and Information Processing	Duration:	6 weeks
Unit 5:	Growth, Development, and Reproduction of Organisms	Duration:	8 weeks
Unit 6:	Natural Selection and Adaptation	Duration:	8 weeks
Unit 7:	Structure and Properties of Matter	Duration::	8 weeks
Date Revision Approved:			
Initial BOE Approval Date:	August 15, 2017		

Pine Hill Public Schools Science Curriculum	
Unit Title:What is STEAM?	Unit #: 1
Course or Grade Level: Gifted and Talented STEAM Grade 6	Length of Time: 3 weeks
Essential Questions	· What is STEAM? What does a democratic classroom look like?
Content	· What do the letters of of STEAM mean? · What are the different types of engineers? · Lab safety skills · What do we need to have a democratic classroom?
Skills	· Define STEAM · Identify different STEAM careers · Research STEAM careers in terms of what they do, how much schooling they require, what starting salary is etc. · Complete engineering activity · Demonstrate teamwork skills, leadership skills, problem solving skills · ENRICHMENT: Define parts of the engineering process using higher level vocabulary like dependent variable, independent variable, constant, control Design an experiment using materials from engineering task to show how these are vital to the engineering design process (toothpick and marshmallow tower)
Math Skills/ Science Processes	· Engineering design skills · Teamwork
Assessments	FORMATIVE: peer discussions, think-pair-share activities, creation of classroom rubrics, procedures, expectations SUMMATIVE: presentation of type of engineer using one of the following platforms: Piktochart, Pow Toons, Google Sites
Inter-disciplinary Connections	· Math · Language Arts · Technology
Lesson resources / Activities	· Smart board files · Internet resources · scavenger hunt, flow chart, research, presentation

New Jersey Student Learning Standards for Science	
Science and Engineering Practices:	**Disciplinary Core Ideas:**
1. Asking questions (for science) and defining problems (for engineering) 2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations (for science) and designing solutions (for engineering) 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	**MS-ETS 1-1: Engineering Design** ● Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. **MS-ETS 1-2: Engineering Design** ● **Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.**
Cross-Cutting Concepts: **Cause and Effect** ● **Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4)** **Scale, Proportion, and Quantity** ● **Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-PS1-1)** **Structure and Function** ● **Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. (MS-PS1-3)**	
ELA/Literacy Companion Standards: **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-PS1-3) **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-PS1-1),(MS-PS1-4) **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-PS1-3)	

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and

synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Pine Hill Public Schools Science Curriculum		
Unit Title: Introduction to Aquaponics		Unit #: 2
Course or Grade Level: Gifted and Talented STEAM Grade 6		Length of Time: 1 week
Essential Questions	· Why aquaponics? How do we create a sustainable future?	
Content	· Benefits and Impacts of Aquaponics Global impacts of aquaponics Sustainability of aquaponics Human impact on resources	
Skills	· Discuss history of agriculture, hydroponics, aquaculture, and aquaponics · Research types of lighting needed, types of plants to grow - Design methods for data collection	
Assessments	Set up aquaponic system	
Inter-disciplinary Connections	· Math – spatial differences, units of measurement · Language Arts – reading, writing, vocabulary · Social Studies – population shifts, societal needs/demands	
Lesson resources / Activities	· Smart board files · Internet resources · scavenger hunt, flow chart, research, presentation	
New Jersey Student Learning Standards for Science		
Science and Engineering Practices:		**Disciplinary Core Ideas:**
1. Asking questions (for science) and defining problems (for engineering) 2. Developing and using models 3. Planning and carrying out investigations		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.

4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations (for science) and designing solutions (for engineering) 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	MS-LS2-3.Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. MS-LS2-4.Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Cross-Cutting Concepts:

Energy and Matter
- Within a natural system, the transfer of energy drives the motion and/or cycling of matter.

Energy and Matter
- Matter is conserved because atoms are conserved in physical and chemical processes.

Cause and Effect
- Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Patterns
- Patterns can be used to identify cause and effect relationships.

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems
- Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation.

Stability and Change
- Small changes in one part of a system might cause large changes in another part.

ELA/Literacy Companion Standards:

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
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.
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).
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.
WHST.6-8.1 Write arguments focused on discipline content.
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.
WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.
SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Mathematics:
MP.4 Model with mathematics.
6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.
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.

6.SP.B.5 Summarize numerical data sets in relation to their context.

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Pine Hill Public Schools Science Curriculum		
Unit Title: Matter and Energy Transformation		Unit #: 3
Course or Grade Level: Gifted and Talented STEAM Grade 6		Length of Time: 8 weeks
Essential Questions	· How are plants producers of their own energy? · How can energy flow through a community? · How can altering the biotic and/or the abiotic factors impact an ecosystem in which they live? · In what way can a change in the population of an ecosystem positively or negatively affect the symbiotic relationships of organisms?	
Content	· Producers and consumers · Photosynthesis and respiration · Biotic and abiotic factors · Energy flow in an ecosystem – food chain, food web · Symbiotic relationships · Population shifts and impact on ecosystems	
Skills	· List differences between producers and consumers · Explain energy release process in photosynthesis and respiration · Explain the relationship between abiotic and biotic factors in an ecosystem · Model/illustrate the flow of energy through a community. · Predict the impact of altering biotic and abiotic factors in an ecosystem. · Describe how a shift in one population in a community can alter the makeup of that community.	
Assessments	Formative: charts, photosynthesis/respiration illustrations, food chain illustrations Summative: Demonstration of photosynthesis and respiration, model of changes in ecosystem.	

	ENRICHMENT: Students will design an ecosystem of their choice and identify biotic/abiotic factors as well as food webs etc. Peer exchange and evaluate what would happen to the system if certain factors changed.
Inter-disciplinary Connections	· Math – spatial differences, units of measurement · Language Arts – reading, writing, vocabulary · Social Studies – population shifts
Lesson resources / Activities	· Glencoe, Prentice Hall · Smart board files, internet · Food chain/web posters · Energy flow models · Flower models - photosynthesis

New Jersey Student Learning Standards for Science

Science and Engineering Practices:	**Disciplinary Core Ideas:**
1. Asking questions (for science) and defining problems (for engineering) 2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations (for science) and designing solutions (for engineering) 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	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. MS-LS2-3.Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. MS-LS2-4.Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Cross-Cutting Concepts:

Energy and Matter
- Within a natural system, the transfer of energy drives the motion and/or cycling of matter.

Energy and Matter
- Matter is conserved because atoms are conserved in physical and chemical processes.

Cause and Effect
- Cause and effect relationships may be used to predict phenomena in natural or designed systems.

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Connections to Nature of Science

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understandable through measurement and observation.

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ELA/Literacy Companion Standards:

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
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.
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).
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.
WHST.6-8.1 Write arguments focused on discipline content.
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.
WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.
SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Mathematics:
MP.4 Model with mathematics.
6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.
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.
6.SP.B.5 Summarize numerical data sets in relation to their context.

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Pine Hill Public Schools Science Curriculum	
Unit Title: Cell Organization and Development	Unit #: 4
Course or Grade Level: Gifted and Talented STEAM Grade 6	Length of Time: 6 weeks
Essential Questions	· How are functions of plant and animal cells carried out by organelles? · What are the differences between single-celled and multi-celled organisms? · How do specialized cells form structures of cells, tissue, organs, and

	organ systems · How are the systems of the human body interrelated to regulate the body's internal environment?
Content	· Functions and parts of cells. · Single-celled, multi-celled organisms · Cell organelles: nucleus, cell wall, cell membrane, mitochondria, lysosomes, endoplasmic reticulum, ribosomes, chloroplast, vacuole · Cell structures – cell, tissue, organs, organ systems · Cell theory, cell research · Homeostasis Biogenesis/Spontaneous Generation
Skills	· Identify names and functions of each part of a cell. · Explain organization of cells, tissues, organs, and organ systems. · Compare characteristics of single-celled and multi-celled organisms. · Proper use of microscope. · Summarize discoveries that led to the development of the cell theory.
Assessments	Formative: Lab notes, cell analogy posters differentiating plant and animal cells Summative: Labs notebooks, Construct and present cell models ENRICHMENT: "Battle For Planet Earth" PBL CELLS-The-Structure-and-Function-of-cells-Battle-For-Planet-Earth-PBL
Inter-disciplinary Connections	· Math – spatial differences, units of measurement · History – sequence of microscope, development of cell theory · Lang Arts – reading, writing, vocab
Lesson resources / Activities	· Life Science Glencoe; Prentice Hall · Smart board files, internet resources ·

New Jersey Student Learning Standards for Science	
Science and Engineering Practices:	**Disciplinary Core Ideas:**
1. Asking questions (for science) and defining problems (for engineering) 2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data	MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

5. Using mathematics and computational thinking 6. Constructing explanations (for science) and designing solutions (for engineering) 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Cross-Cutting Concepts:

Scale, Proportion, and Quantity

- **Phenomena that can be observed at one scale may not be observable at another scale.**

Connections to Engineering,Technology and Applications of Science

Interdependence of Science, Engineering, and Technology

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

Structure and Function

- **Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function.**

Cause and Effect

- **Cause and effect relationships may be used to predict phenomena in natural systems.**

ELA/Literacy Companion Standards:

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
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.
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.
WHST.6-8.1 Write arguments focused on discipline content.
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.

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. **SL.8.5** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
Mathematics: **6.EE.C.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. **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. **6.SP.B.4** Summarize numerical data sets in relation to their context.
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Pine Hill Public Schools Science Curriculum		
Unit Title: Heredity and Reproduction		Unit #: 5
Course or Grade Level: Gifted and Talented STEAM Grade 6		Length of Time: 8 Weeks
Essential Questions	· How is the survival of a species dependent upon reproduction? · Why do variations exist among same generation and different generations of a species? · How do inherited traits different from acquired traits? · What is the difference between sexual and asexual reproduction? · How do environmental and/or inherited factors influence characteristics of an organism?	
Content	Mitosis · Mitosis in plant and animal cells · Asexual reproduction · Meiosis, production of sex cells	

	· Cell involved in fertilization · DNA · Inherited traits/acquired traits · Mendel's role in genetics · Punnett Square · Genetic variation, environmental factors
Skills	· Explain function and steps of mitosis Meiosis (Enrichment Only) · Compare mitosis in plant and animal cells. · List examples of asexual reproduction. · Describe stages of meiosis and how sex cells are produced. · Explain why meiosis is needed for sexual reproduction. · Identify the parts of the DNA model. · Distinguish between inherited and acquired traits/characteristics. · Explain how genetic traits are passed from one generation to the next through reproduction using evidence collected from observations of inherited traits. · Explain variations among siblings using a Punnett Square model. · Describe how environmental factors affect or alter effects of genes. ENRICHMENT: Epigenetics
Assessments	Timeline models of mitosis and meiosis. Lab experiments – extracting DNA. Lab notebooks, tests, quizzes. Construct a Punnett square. ENRICHMENT: Twin + Twin = Identical PBL Activity http://www.teachercollaborate.org/twin--twin--identical-genetics-pbl-activity.html Extracting DNA activity
Inter-disciplinary Connections	· Lang Arts – reading, writing, vocabulary · Math – probability and statistics
Lesson resources / Activities	· Life Science Glencoe- · McGraw Hill 2002 · *Resource box for book including tests, worksheets, enhancements, overhead transparencies · Smiley face genetics www.sciencspot.net

New Jersey Student Learning Standards for Science	
Science and Engineering Practices:	**Disciplinary Core Ideas:**
1. Asking questions (for science) and defining problems (for engineering)	MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to

2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations (for science) and designing solutions (for engineering) 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

Cross-Cutting Concepts:

Cause and Effect

- Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.

Structure and Function

- Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function.

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural systems.

ELA/Literacy Companion Standards:

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.

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.

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.

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).

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.

WHST.6-8.1 Write arguments focused on discipline content.

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.

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.

WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Mathematics:

MP.4 Model with mathematics.

6.SP.B.5 Summarize numerical data sets in relation to their context.

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Pine Hill Public Schools Science Curriculum	
Unit Title: Evolution and Diversity	Unit #: 6
Course or Grade Level: Gifted and Talented STEAM Grade 6	Length of Time: 8 weeks
Essential Questions	· How do environmental conditions affect survival or individual organisms or entire species? · How does natural selection lead to evolution? · How do new species form? · How can adaptation allow a species to survive or cause a species to become extinct? · How can anatomical evidence of fossils support evolution?
Content	

	· Evolution · Darwin's theory · Natural selection · Variations in organisms · Adaptations · Fossil evidence
Skills	· Describe Darwin's theory of evolution. · Identify why variations in organisms are important. · Describe the differences among living primates. · Identify the adaptations of primates. · Construct a geologic time scale showing evolution of organisms. · Investigate how natural selection can lead to changes in a species over time using a model.
Assessments	Formative: Adaptation lab (bird beaks), student notes, outlines, Summative: Drawing conclusions from adaptation lab activities, designing an experiment investigating natural selection, interpreting geologic time scale ENRICHMENT: Extinction of Humanity… what adaptations do they need to exist in 4 environments based on Global Climate Change? https://betterlesson.com/lesson/635476/introduction-of-pbl-is-it-the-end-of-humanity
Inter-disciplinary Connections	· Math – units of measurement, charts, graphs · Social Studies – geologic time lines · Language Arts - reading, writing, vocabulary
Lesson resources / Activities	· Life Science Glencoe; Prentice Hall · Smart board files, internet resources · Student notes, handouts · Evolution videos (Bill Nye)

New Jersey Student Learning Standards for Science	
Science and Engineering Practices:	**Disciplinary Core Ideas:**
1. Asking questions (for science) and defining problems (for engineering) 2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data	MS-LS4-5.Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of

5. Using mathematics and computational thinking 6. Constructing explanations (for science) and designing solutions (for engineering) 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	desired traits in organisms. MS-LS4-3.Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. MS-LS4-4.Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Cross-Cutting Concepts:

Patterns

- Graphs, charts, and images can be used to identify patterns in data.

Cause and Effect

- Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.

Connections to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology

- Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.

Connections to Nature of Science

Science Addresses Questions About the Natural and Material World

- Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes.

ELA/Literacy Companion Standards:

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.

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).

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.

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.

WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

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.

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.

Mathematics:

MP.4 Model with mathematics.

6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

6.SP.B.5 Summarize numerical data sets in relation to their context.

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.

7.RP.A.2 Recognize and represent proportional relationships between quantities.

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Pine Hill Public Schools Science Curriculum		
Unit Title: Matter		Unit #: 7
Course or Grade Level: Gifted and Talented STEAM Grade 6		Length of Time: 8 Weeks
Essential Questions	· How do the properties of materials determine their use?	
Content	· Density calculations · States of matter (Solid, Liquid, Gas)	

	· Behavior of matter (molecule movement, volume, and shape)
Skills	· List the differences among atoms, elements, molecules and compounds · Demonstrate the relationship between volume and mass in terms of density of an object · Calculate density of objects using mass and volume · Determine the volume of objects using water displacement · Explain that all matter is made up of atoms · Define matter · Compare/contrast the behavior of matter in terms of molecule movement, shape, and volume · Explain how molecule movement, shape, and volume change during the processes of heating and cooling · Explain relationship between elements, molecules, compounds and matter Create a model of molecules, compounds, and mixtures
Math Skills/ Science Processes	· Finding the mass, volume, and length of objects Finding the difference between the mass, volume, and length of objects
Assessments	FORMATIVE: label diagrams of molecule movement in different states, worksheets on density calculation SUMMATIVE: poster presentation of relationship between elements, molecules, compounds and matter, water displacement lab activity ENRICHMENTt: Super Stuff for Sports http://www.kidsciencechallenge.com/year-four/teachers_plans_archives.php
Inter-disciplinary Connections	· Math · Language Arts
Lesson resources / Activities	· Smart board files · Internet resources

New Jersey Student Learning Standards for Science	
Science and Engineering Practices:	**Disciplinary Core Ideas:**
1. Asking questions (for science) and defining problems (for engineering)	**MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures.** **PS1.A: Structure and Properties of Matter**

2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations (for science) and designing solutions (for engineering) 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	● 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. ● Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). **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.

Cross-Cutting Concepts:

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

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

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

ELA/Literacy Companion Standards:

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-PS1-3)

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-PS1-1),(MS-PS1-4)

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-PS1-3)

Mathematics:

MP.2 Reason abstractly and quantitatively.
MP.4 Model with mathematics.
6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.
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.
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.
6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
6.SP.B.5 Summarize numerical data sets in relation to their context

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.