			Physical Science Grade 8 **Matter One**
Course/Subject: **Physical Science**	**Grade: 8**	**Unit 1: Matter One**	**Suggested Timeline:** **4 Weeks**

Grade Level Summary	This course is an introduction to Physics and Chemistry. The course is presented to all students in eighth grade and meets daily for 45 minutes. No prerequisite course is required. To provide students with a basic knowledge of chemistry and physics, each topic will consist of an introduction by the teacher, examples and demonstrations, and age appropriate activities performed by the students. Each unit includes evaluation of learning demonstrated by both written and performance based activities. Students explore the topics of physical science using traditional lab based hands-on activities as well as virtual activities online. Students will acquire scientific knowledge in the areas of the Nature of Science, Unifying Themes in Science, and knowledge in the specific content areas described below.
Grade Level Units	Unit 1: Matter One Unit 2: Matter Two Unit 3: Simple Machines Unit 4: Atomic Structure Unit 5: Periodic Table Unit 6: Alternative Energy Unit 7: Electricity

Unit Title	Matter One - Solids & Liquids
Unit Summary	Matter occurs in four main phases. This unit focuses on the behaviors and characteristics of solids in the crystalline and amorphous form. The measurable properties of liquid cohesion, adhesion, viscosity, and density are defined as well. Liquids and solids are compared in terms of the energy level of the atoms and molecules comprising the substances.

Unit Essential Questions:	**Key Understandings:**
1. What are the properties of a solid? 2. What are the properties of a liquid?	1. Matter occurs in four main phases. 2. Solids have specific characteristics that distinguish them from other phases. 3. Liquids have specific characteristics that distinguish them from other phases.

Focus Standards Addressed in the Unit:

Standard Number	*Standard Description*
3.2.7.A1.	Explain how materials are characterized by having a specific amount of mass in each unit of volume (density).
3.2.8.A1.	Differentiate between mass and weight.

3.2.6.A1.	Differentiate between volume and mass. Investigate that equal volumes of different substances usually have different masses.
3.2.8.A3.	Explain how changes in matter are accompanied by changes in energy.

Important Standards Addressed in the Unit:	
CC.3.6.6-8.H.	Draw evidence from informational texts to support analysis reflection, and research.
CC.3.6.6-8.C.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CC.3.5.6-8.C.	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Misconceptions:	**Proper Conceptions:**
1. There are only three states of matter 2. Solids are hard substances that hold their shape. 3. Density and thickness are synonyms.	1. There are four states of matter 2. Some solids do not hold their shape well, if at all. 3. A less dense liquid can have a higher viscosity.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Everything in the universe is either matter or energy ● Matter exists in four phases; solid, liquid, gas and plasma. ● The phase of matter is determined by the energy level of the atoms and molecules that form the substance. ● There are two main categories of solids ● There are four measurable properties of liquids ● Density equals mass divided by volume ● The scientific method is a process for experimentation used to explore observations and answer questions	● When given steps in sequence, students will follow laboratory procedures ● Students will compare and contrast crystalline & amorphous solids in the lab ● When given solid objects, students will measure their mass and volume ● Students will apply the water displacement method to determine volume of irregular solids ● Students will calculate the density of objects once the mass and volume are known ● Students will test measurable properties of liquids	● Precision in measurement using lab tools and equipment ● Communication and collaboration within lab groups ● Critical thinking regarding lab data ● Analyzation of lab data ● Creative use of science vocabulary to tell a story

Academic Vocabulary:		
● matter, energy, crystalline, amorphous, polymer, cross linker, liquid, viscosity, adhesion, cohesion, density, volume, mass, Archimedes		

Assessments:

- Crystalline Solids Lab Practical
- Density Lab Practical
- Displacement Lab Practical

- Unit One Written Exam
- Unit One Text Dependent Analysis

Differentiation:

- Assignments contain Advanced Requirements designed to allow students who process the material more quickly to complete analysis, application, and critical thinking using the content specific to each assignment.
- IEP and 504 Implementation as indicated per individual student.

Interdisciplinary Connections:

- TDA using grade level scientific article, article will contain unit vocabulary
- Use These Words in a Story creative writing piece using unit vocabulary
- Algebraic formula for density

Additional Resources:

- Videos to demonstrate lab techniques
- Screencasts of lecture notes
- Virtual labs provided by free access Internet sites
- Grade level science articles
- Lab "kits" created by teacher containing equipment and supplies specific to each lab activity

Created By: Tammy Podlaski

			Physical Science Grade 8 **Matter Two**
Course/Subject: **Physical Science**	**Grade: 8**	**Unit 2: Matter Two**	**Suggested Timeline:** **5 Weeks**

Grade Level Summary	This course is an introduction to Physics and Chemistry. The course is presented to all students in eighth grade and meets daily for 45 minutes. No prerequisite course is required. To provide students with a basic knowledge of chemistry and physics, each topic will consist of an introduction by the teacher, examples and demonstrations, and age appropriate activities performed by the students. Each unit includes evaluation of learning demonstrated by both written and performance based activities. Students explore the topics of physical science using traditional lab based hands-on activities as well as virtual activities online. Students will acquire scientific knowledge in the areas of the Nature of Science, Unifying Themes in Science, and knowledge in the specific content areas described below.
Grade Level Units	Unit 1: Matter One Unit 2: Matter Two Unit 3: Simple Machines Unit 4: Atomic Structure Unit 5: Periodic Table Unit 6: Alternative Energy Unit 7: Electricity

Unit Title	Matter Two - Fluid Forces
Unit Summary	This unit focuses on the behaviors of fluids, which include the liquid and gas state of matter. The dynamic interactions between the pressure, volume, and temperature of fluids are explored through application of the Gas Laws. Archimedes Principle, Pascal's Law, and Bernoulli's Principle are articulated and demonstrated in the lab setting.

Unit Essential Questions:	**Key Understandings:**
1. How does changing the temperature of a fluid affect the volume? 2. How does changing the pressure of a fluid affect the volume? 3. How do air molecules move to equalize pressure?	1. Fluids include both liquids and solids. 2. Pressure moves towards equilibrium from high pressure zones to low pressure zones. 3. Liquids are not compressible. 4. Gases are compressible.

Focus Standards Addressed in the Unit:

Standard Number	*Standard Description*
3.2.6.A1.	Distinguish the differences in properties of solids, liquids, and gases. Differentiate between volume and mass.
3.2.7.B3. **3.2.7.B6.**	Explain why heat energy consists of the random motion and vibrations of the particles of matter Demonstrate how the transfer of heat energy causes temperature changes.

3.2.7.A3.	Explain how energy transfer can affect the chemical and physical properties of matter.
3.2.8.A3.	Explain how changes in matter are accompanied by changes in energy.

Important Standards Addressed in the Unit:	
3.4.8.A2.	Explain how controls are steps that people perform using information about the system that causes the system to change.
3.4.6.D3.	Design and use instruments to evaluate data.
3.2.6.A3.	Explain and give examples of how mass is conserved in a closed system.
3.2.8.B6.	Explain how physics principles underlie everyday phenomena and important technologies.
CC.3.5.6-8.C	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Misconceptions:	**Proper Conceptions:**
1. Suction is a force. 2. Planes fly because of their propellers.	1. Suction does not exist. What we typically describe as suction is the result of unequal air pressure. 2. Planes have lift due to unequal air pressure masses above and below the wings.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Liquids and gases are both considered fluids ● Fluids behave in predictable ways when the variables of pressure, volume, and temperature are altered. ● An object in fluid is pushed up with a buoyant force equal to the weight of the water it displaces. ● Pressure is transmitted equally in all directions to all parts of a fluid. ● The pressure of a moving stream is less than the pressure of the surrounding fluid.	● Students will use an overflow can to determine displacement volume of objects ● Students will model Archimedes principle to determine that matter sinks or floats based upon density ● Students will predict the submerged mass of objects by determining the displacement volume and the mass of the object in air ● Students will use rubber tubing and syringes to create hydraulic systems ● Students will predict the behavior of fluids based on Pascal's Law ● Students will experiment with Boyle's Law, Charles's Law and Bernoulli's Principle to predict the behaviors of fluids	● Precision in measurement using lab tools and equipment ● Communication and collaboration within lab groups ● Creative problem solving skills to complete lab challenges ● Critical thinking regarding lab data ● Analyzation of lab data ● Creative use of science vocabulary to tell a story ● Reading science texts for meaning

Academic Vocabulary:		
● Fluid, gas, liquid, Archimedes Principle, buoyancy, Boyle's Law, Charles's Law, Pascal's Law, pressure, hydraulics, Bernoulli's Principle		

Assessments:

- Archimedes Principle Lab Practical
- Hydraulic Arm Lab Practical
- Water on a String Lab Practical
- Unit 2 Written Exam
- Unit 2 Text Dependent Analysis

Differentiation:

- Assignments contain Advanced Requirements designed to allow students who process the material more quickly to complete analysis, application, and critical thinking using the content specific to each assignment.
- IEP and 504 Implementation as indicated per individual student.

Interdisciplinary Connections:

- Algebraic formulas for Boyle's Law, and Charles's Law
- Written conclusions for lab data
- TDA using grade level scientific article, article will contain unit vocabulary
- Use These Words in a Story creative writing piece using unit vocabulary

Additional Resources:

- Videos to demonstrate lab techniques
- Screencasts of lecture notes
- Virtual labs provided by free access Internet sites
- Grade level science articles
- Lab "kits" created by teacher containing equipment and supplies specific to each lab activity

Created By: Tammy Podlaski

			Physical Science Grade 8 **Simple Machines**
Course/Subject: **Physical Science**	**Grade: 8**	**Unit 3: Simple Machines**	**Suggested Timeline:** **4 - 5 Weeks**

Grade Level Summary	This course is an introduction to Physics and Chemistry. The course is presented to all students in eighth grade and meets daily for 45 minutes. No prerequisite course is required. To provide students with a basic knowledge of chemistry and physics, each topic will consist of an introduction by the teacher, examples and demonstrations, and age appropriate activities performed by the students. Each unit includes evaluation of learning demonstrated by both written and performance based activities. Students explore the topics of physical science using traditional lab based hands-on activities as well as virtual activities online. Students will acquire scientific knowledge in the areas of the Nature of Science, Unifying Themes in Science, and knowledge in the specific content areas described below.
Grade Level Units	Unit 1: Matter One Unit 2: Matter Two Unit 3: Simple Machines Unit 4: Atomic Structure Unit 5: Periodic Table Unit 6: Alternative Energy Unit 7: Electricity

Unit Title	Simple Machines
Unit Summary	This unit articulates the six simple machines. Each machine is studied in isolation in the lab setting to determine how it is used to trade force for distance. Friction is investigated as a force that opposes motion and creates inefficiency in machines. The four basic methods for reducing friction are explored in the lab. Compound machines are introduced as tools that combine two or more simple machines in order to accomplish work.

Unit Essential Questions:	**Key Understandings:**
1. What is work? 2. What are the six simple machines? 3. How can machines be used to trade force for distance? 4. How does friction affect a machine's efficiency?	1. Work is done when a force moves an object a measureable distance. 2. The six simple machines are: inclined plane, wedge, screw, lever, pulley, and wheel & axle 3. Each simple machine is designed to trade force for distance in one movement. 4. There are four main ways to reduce friction.

Focus Standards Addressed in the Unit:

Standard Number	*Standard Description*

3.4.6.E3 **3.4.7.E3.** **3.4.8.E3.**	Investigate that power is the rate at which energy is converted from one form to another or transferred from one place to another Examine the efficiency of energy use in our environment. Examine power systems are used to drive and provide propulsion to other technological products or systems
3.4.6.C2. **3.4.7.C2.** **3.4.8.C2.**	Show how models are used to communicate and test design ideas and processes Explain how modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions Explore the design process as a collaborative endeavor in which each person in the group presents his or her ideas in an open forum.
3.4.6.C1. **3.4.8.C1.**	Recognize that requirements for a design include such factors as the desired elements and features of a product or system or the limits that are placed on that design Evaluate the criteria and constraints of a design
3.2.6.B1	Explain how changes in motion require a force

Important Standards Addressed in the Unit:	
3.4.8.B3.	Explain how throughout history, new technologies have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
3.4.7.B3.	Describe how invention and innovation lead to changes in society and the creation of new needs and wants.
3.4.7.B4.	Explain how many inventions and innovations have evolved by using deliberate and methodical processes of tests and refinements.
3.2.6.B1	Describe how unbalanced forces acting on an object change its velocity.

Misconceptions:	**Proper Conceptions:**
1. Machines are electronic. 2. Anything you do that requires time or thought is work. 3. Power and strength are synonyms.	1. A machine is anything that makes our work easier. 2. Work is only done when a measurable force is applied over a measurable distance. 3. Power is work divided by time.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● The six simple machines are: inclined plane, wedge, screw, lever, pulley, and wheel & axle ● Mechanical advantage is the number of times a machine multiplies your effort force. ● MA greater than one means a gain in force, less than one means a change in direction, equal to one results in a change of direction of the force applied. ● Friction is a force that opposes motion and can be reduced four different ways. ● Work is force multiplied by distance.	● When given model versions of the simple machines, students will calculate work, power, horsepower, and mechanical advantage by applying mathematical formulas. ● Students will identify the relationship between effort distance and effort force by using and testing different machine models. ● Students will classify levers. ● Students will design, draw, and build compound machines. ● Students will identify the simple machines in everyday tools.	● Precision in measurement using lab tools and equipment ● Communication and collaboration within lab groups ● Critical thinking regarding lab data ● Analyzation of lab data ● Creative use of science vocabulary to tell a story ● Creative design and drawing of a Rube Goldberg Machine ● Creative design and build of a car which combines gains in strength and distance.

● Compound machines are two or more simple machines combined to make work easier		

Academic Vocabulary:

● Force, work, power, horsepower, mechanical advantage, friction, inclined plane, wedge, screw, lever, wheel and axle, pulley, compound machine		

Assessments:

- King of the Hill lab practical
- Rube Goldberg Machine design
- Inclined Plane lab practical
- Unit 3 Written Exam
- Unit 3 Text Dependent Analysis

Differentiation:

- Assignments contain Advanced Requirements designed to allow students who process the material more quickly to complete analysis, application, and critical thinking using the content specific to each assignment.
- IEP and 504 Implementation as indicated per individual student.

Interdisciplinary Connections:

- Algebraic formulas for work, power, horsepower, and mechanical advantage.
- Creative writing explanation of Rube Goldberg machine.
- Reading science text for content.
- Historical context of simple machines invented by Archimedes and used in applications for battle.

Additional Resources:

- Videos to demonstrate lab techniques
- Screencasts of lecture notes
- Virtual labs provided by free access Internet sites
- Grade level science articles
- Lab “kits” created by teacher containing equipment and supplies specific to each lab activity

Created By: Tammy Podlaski

			Physical Science Grade 8 **Atomic Structure**
Course/Subject: **Physical Science**	**Grade: 8**	**Unit 4: Atomic Structure**	**Suggested Timeline:** **4Weeks**

Grade Level Summary	This course is an introduction to Physics and Chemistry. The course is presented to all students in eighth grade and meets daily for 45 minutes. No prerequisite course is required. To provide students with a basic knowledge of chemistry and physics, each topic will consist of an introduction by the teacher, examples and demonstrations, and age appropriate activities performed by the students. Each unit includes evaluation of learning demonstrated by both written and performance based activities. Students explore the topics of physical science using traditional lab based hands-on activities as well as virtual activities online. Students will acquire scientific knowledge in the areas of the Nature of Science, Unifying Themes in Science, and knowledge in the specific content areas described below.
Grade Level Units	Unit 1: Matter One Unit 2: Matter Two Unit 3: Simple Machines Unit 4: Atomic Structure Unit 5: Periodic Table Unit 6: Alternative Energy Unit 7: Electricity

Unit Title	Atomic Structure
Unit Summary	All matter is made of atoms. These atoms consist of fundamental particles governed by fundamental forces. The Periodic Table of the elements is used to determine the proton, neutron and electron number of any element. Electrons occupy specific areas outside the nucleus. Instability and radioactivity are attributed to unexpected numbers of neutrons. Unstable atoms will stabilize themselves over time through the process of radioactive decay and transmutate in predictable ways. Radioactivity is generally seen as a harmful state, yet there are numerous ways in which radioactive materials are useful to us. Atoms are represented by chemical symbols which can be combined to write chemical equations for reactions performed in the lab. The Law of Conservation of Mass must be honored in any chemical reaction and can be checked through the process of balancing equations.

Unit Essential Questions:	**Key Understandings:**
1. What are the three basic subatomic particles? 2. How can we use the Periodic Table to determine the number of subatomic particles in any atom? 3. What happens when an atom is unstable? 4. What is the difference between atoms and molecules?	1. Matter is made of atoms 2. Atoms are made of a nucleus containing protons and neutrons with electrons orbiting the nucleus. 3. Electrons orbit the nucleus in regions called quantums and each quantum can hold a specific number of electrons. 4. Matter can neither be created nor destroyed in any normal chemical reaction. 5. Unstable atoms will stabilize over time. 6. Atoms combine to form molecules.

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.2.7.A2.	Identify atoms as the basic building blocks of matter and that elements are composed of one type of matter.
3.2.7.A4.	Describe how reactants change into products in simple chemical reactions.
3.2.8.A4.	Compare and contrast physical and chemical changes in terms of products.
3.2.7.A1.	Differentiate between elements, compounds, and mixtures.

Important Standards Addressed in the Unit:	
3.4.8.A2	Explain how controls are steps that people perform using information about the system that causes the system to change.
3.2.6.A2.	Compare and contrast pure substances with mixtures.
3.2.6.A4.	Differentiate between physical and chemical changes.
3.2.8.B6.	Explain how physics principles underlie everyday phenomena and important technologies.

Misconceptions:	**Proper Conceptions:**
1. The words "atom" and "molecule" are interchangeable. 2. Radiation is bad for our health.	1. An atom is the smallest pieces of an element that still contain all the characteristics of that element. A molecule is the smallest piece of a compound. 2. While long term exposure to radiation can have harmful effects, there are also some valuable applications for radiation.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● All matter is made of atoms ● Atoms consist of a nucleus containing protons and neutrons with electrons orbiting the nucleus ● Electrons occupy specific orbitals outside the nucleus ● Atoms can not be created or destroyed ● An unstable atom will undergo predictable processes to stabilize itself over time	● Determine proton, neutron, and electron number using the Periodic Table ● Differentiate between elements, compounds, and mixtures ● Apply radioactive decay formula to solve equations ● Draw electron configurations ● Balance chemical equations	● Communication and collaboration within lab groups ● Critical thinking regarding lab data ● Analyzation of lab data ● Creative use of science vocabulary to tell a story

Academic Vocabulary:		
● Atom, element, compound, proton, neutron, electron, orbital, nucleus,		

isotope, half life, radioactive, molecule, products, reactants		

Assessments:

- Reading Chemical Formulas Quiz
- Balancing Equations Quiz
- Models of the Atom Timeline
- Atomic Structure Unit Test

Differentiation:

- Assignments contain Advanced Requirements designed to allow students who process the material more quickly to complete analysis, application, and critical thinking using the content specific to each assignment.
- IEP and 504 Implementation as indicated per individual student.

Interdisciplinary Connections:

- TDA using grade level scientific article, article will contain unit vocabulary
- Use These Words in a Story creative writing piece using unit vocabulary
- Historic and societal impact of Nuclear Weapons researched and developed during WWII
- Organizing steps in sequence to create Models of the Atom timeline

Additional Resources:

- Videos to demonstrate lab techniques
- Screencasts of lecture notes
- Virtual labs provided by free access Internet sites
- Grade level science articles
- Lab "kits" created by teacher containing equipment and supplies specific to each lab activity

Created By: Tammy Podlaski

			Physical Science Grade 8 **Periodic Table**
Course/Subject: **Physical Science**	**Grade: 8**	**Unit 5: Periodic Table**	**Suggested Timeline:** **3 Weeks**

Grade Level Summary	This course is an introduction to Physics and Chemistry. The course is presented to all students in eighth grade and meets daily for 45 minutes. No prerequisite course is required. To provide students with a basic knowledge of chemistry and physics, each topic will consist of an introduction by the teacher, examples and demonstrations, and age appropriate activities performed by the students. Each unit includes evaluation of learning demonstrated by both written and performance based activities. Students explore the topics of physical science using traditional lab based hands-on activities as well as virtual activities online. Students will acquire scientific knowledge in the areas of the Nature of Science, Unifying Themes in Science, and knowledge in the specific content areas described below.
Grade Level Units	Unit 1: Matter One Unit 2: Matter Two Unit 3: Simple Machines Unit 4: Atomic Structure Unit 5: Periodic Table Unit 6: Alternative Energy Unit 7: Electricity

Unit Title	Periodic Table of the Elements
Unit Summary	All known elements are listed on a periodic table. Elements are organized into columns and rows based on their physical and chemical properties, and these properties show a regular repeating pattern. Using the Periodic Table as a reference, we can determine an element's reactivity, size, valence number, metallic nature, and number of electron shells.

Unit Essential Questions:	**Key Understandings:**
1. What are periods of elements? 2. What are groups of elements? 3. What are the families of elements? 4. What is the reactivity trend for metals and nonmetals?	1. Elements in the same column have the same number of valence electrons. 2. Elements in the same row have the same number of valence shells. 3. Elements in the same family have similar behaviors and characteristics. 4. The zig zag line divides the periodic table into three main groups: metals, nonmetals, and metalloids

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.2.8.A2.	Identify characteristics of elements derived from the periodic table.

3.2.7.A1.	Identify groups of elements that have similar properties.
3.2.6.A5.	Identify characteristic properties of matter that can be used to separate one substance from the other

Important Standards Addressed in the Unit:	
3.2.7.A4.	Describe how reactants change into products in simple chemical reactions.
3.2.7.A2.	Identify atoms as the basic building blocks of matter and that elements are composed of one type of atom
CC.3.5.6-8.D	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.

Misconceptions:	**Proper Conceptions:**
1. Elements are organized randomly on the periodic table. 2. To learn about the periodic table, it must be memorized.	1. Elements are organized in order of increasing atomic number and placed into columns and rows based on their physical and chemical characteristics. 2. Understanding the trends present on the table makes memorization pointless.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Elements are organized into periods and groups ● The zig zag line divides metallic elements from non metallic ones ● Elements in the same family have similar characteristics ● Metals become more reactive moving downward and to the left ● Non-metals become more reactive moving up and to the right ● Every atom attempts to obtain a full valence shell	● Classify any element as metal, non-metal, or metalloid based upon location on the Periodic Table ● Predict the reactivity of any element based upon location on the Periodic Table ● Differentiate between families of elements based upon family characteristics ● Identify elements when given coordinates for the period and group in which the element resides	● Precision in measurement using lab tools and equipment ● Communication and collaboration within lab groups ● Critical thinking regarding lab data ● Analyzation of lab data ● Creative thinking to design an element scrapbook/baby book

Academic Vocabulary:		
● Periods, groups, valence, metal, nonmetal, metalloid, alkali metals, alkaline earth metals, transition metals, rare earth metals, other metals, halogens, noble gases, reactivity		

Assessments:

- Alien Periodic Table Logic Puzzle
- Reactivity lab practical
- Periodic Table of the Elements Unit Test

Differentiation:

- Assignments contain Advanced Requirements designed to allow students who process the material more quickly to complete analysis, application, and critical thinking using the content specific to each assignment.
- IEP and 504 Implementation as indicated per individual student.

Interdisciplinary Connections:

- TDA using grade level scientific article, article will contain unit vocabulary
- Use These Words in a Story creative writing piece using unit vocabulary

Additional Resources:

- Videos to demonstrate lab techniques
- Screencasts of lecture notes
- Virtual labs provided by free access Internet sites
- Grade level science articles
- Lab "kits" created by teacher containing equipment and supplies specific to each lab activity

Created By: Tammy Podlaski

			Physical Science Grade 8 **Alternative Energy**
Course/Subject: **Physical Science**	**Grade: 8**	**Unit 6: Alternative Energy**	**Suggested Timeline:** **4 Weeks**

Grade Level Summary	This course is an introduction to Physics and Chemistry. The course is presented to all students in eighth grade and meets daily for 45 minutes. No prerequisite course is required. To provide students with a basic knowledge of chemistry and physics, each topic will consist of an introduction by the teacher, examples and demonstrations, and age appropriate activities performed by the students. Each unit includes evaluation of learning demonstrated by both written and performance based activities. Students explore the topics of physical science using traditional lab based hands-on activities as well as virtual activities online. Students will acquire scientific knowledge in the areas of the Nature of Science, Unifying Themes in Science, and knowledge in the specific content areas described below.
Grade Level Units	Unit 1: Matter One Unit 2: Matter Two Unit 3: Simple Machines Unit 4: Atomic Structure Unit 5: Periodic Table Unit 6: Alternative Energy Unit 7: Electricity

Unit Title	Alternative Energy
Unit Summary	Energy is required to power our technological world. Current dependence upon fossil fuels has far-reaching implications for our economy as well as our environment. Alternative sources of energy could help reduce our dependence on fossil fuels. Alternatives include solar power, wind power, hydropower, nuclear energy, biomass, hydrogen, and geothermal energy. Energy alternatives can reduce greenhouse gas emissions and slow global climate change.

Unit Essential Questions:	**Key Understandings:**
1. What are renewable resources? 2. What are non-renewable resources? 3. What are the three main greenhouse gases? 4. What is global climate change?	1. Fossil fuels are non-renewable. 2. Each alternative source of energy has pros and cons. 3. Climate change threatens our economy as well as the environment and its diversity.

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
4.5.7.C. **4.5.8.C.**	Explain how human actions affect the health of the environment. Identify residential and industrial sources of pollution and their effects on environmental health. Describe how humans can reduce pollution.
4.3.8.A.	Compare and contrast alternative sources of energy

4.3.7.A. **4.3.7.B.**	Explain how products are derived from natural resources Explain the distribution and management of natural resources.
4.3.7.D. **4.3.8.D.** **3.4.7.E6.**	Describe the wastes derived from using resources, how the waste is managed, and the potential impact on the environment Compare and contrast waste generated from various sources of energy. Examine the processes involved in extracting (eg. harvesting, drilling, mining) raw materials from the earth for use in manufacturing processes.

Important Standards Addressed in the Unit:	
4.5.7.A.	Describe how the development of civilization affects the use of natural resources. Compare and contrast how people use natural resources in sustainable and non-sustainable ways throughout the world.
3.4.7.B2.	Explain how decisions to develop and use technologie may be influenced by environmental and economic concerns.
3.4.8.B2.	Compare and contrast decisions to develop and use technologies as related to environmental and economic concerns.
3.2.7.B.2.	Describe how energy can be changed from one form to another (transformed) as it moves through a system or transferred from one system to another system.

Misconceptions:	**Proper Conceptions:**
1. There are no negative side effects to alternative energy sources. 2. Climate change leads to hotter temperatures and drought.	1. Each alternative source has benefits as well as drawbacks. 2. Climate change can include drought, severe rainfall, flooding, and blizzards.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● There is a high demand for energy to fuel current technology ● Burning fossil fuels releases greenhouse gases ● Alternative sources of energy can reduce greenhouse gas emissions ● Greenhouse gases contribute to global climate change	● Compare and contrast various sources of energy ● Differentiate between renewable and non-renewable sources of energy ● Articulate possible effects of climate change ● Presentation skills including eye contact, inflection, rate of speech, etc.	● Organization of a mini lesson ● Research ● Communication and collaboration with classmates ● Presentation of a mini lesson

Academic Vocabulary:		
● Solar, hydropower, wind, hydrogen, geothermal, biomass, nuclear energy, coal, oil, natural gas, renewable, nonrenewable, fossil fuels		

Assessments:

- Mini lesson presentation
- Energy Unit Test

Differentiation:

- Assignments contain Advanced Requirements designed to allow students who process the material more quickly to complete analysis, application, and critical thinking using the content specific to each assignment.
- IEP and 504 Implementation as indicated per individual student.

Interdisciplinary Connections:

- TDA using grade level scientific article, article will contain unit vocabulary
- Use These Words in a Story creative writing piece using unit vocabulary
- Note-taking and presentation skills

Additional Resources:

- Videos to demonstrate lab techniques
- Screencasts of lecture notes
- Virtual labs provided by free access Internet sites
- Grade level science articles
- Lab "kits" created by teacher containing equipment and supplies specific to each lab activity

Created By: Tammy Podlaski

			Physical Science Grade 8 **Electricity**
Course/Subject: **Physical Science**	**Grade: 8**	**Unit 7: Electricity**	**Suggested Timeline:** **4 Weeks**

Grade Level Summary	This course is an introduction to Physics and Chemistry. The course is presented to all students in eighth grade and meets daily for 45 minutes. No prerequisite course is required. To provide students with a basic knowledge of chemistry and physics, each topic will consist of an introduction by the teacher, examples and demonstrations, and age appropriate activities performed by the students. Each unit includes evaluation of learning demonstrated by both written and performance based activities. Students explore the topics of physical science using traditional lab based hands-on activities as well as virtual activities online. Students will acquire scientific knowledge in the areas of the Nature of Science, Unifying Themes in Science, and knowledge in the specific content areas described below.
Grade Level Units	Unit 1: Matter One Unit 2: Matter Two Unit 3: Simple Machines Unit 4: Atomic Structure Unit 5: Periodic Table Unit 6: Alternative Energy Unit 7: Electricity

Unit Title	Electricity
Unit Summary	Electricity is a force caused by electrons. Some substances allow electrons to flow easily, while others block the flow of electrons. Static or stationary electrons behave differently than electrons moving in a current. To be able to use electricity, we must be able to direct it. Circuits and generators allow us to control electrons and dictate when they move and where they move. The electrical energy carried by electrons can be transferred into sound, light, motion, or heat.

Unit Essential Questions:	**Key Understandings:**
1. What is electricity? 2. How do we generate electricity? 3. How do we control electricity? 4. How is the flow of electrons measured?	1. Electricity is a force caused by negatively charged electrons. 2. Generators consist of a magnet, a coil of wire, and motion. 3. Circuits require an electrical source, a conductive pathway, an electrical load, and a switch to help us control electrons. 4. We measure both the current and voltage of electron flow.

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.2.6.B4.	Describe how electric current produces magnetic forces and how moving magnets produce electric current. Derive Ohm's Law through the investigation of voltage, current, and resistance

3.2.7.B4.	Explain how electrical current is produced by the flow of electrons Explain and demonstrate how electric current produces magnetic forces and how moving magnets produce electric current
3.2.8.B4.	Compare and contrast atomic properties of conductors and insulators
3.2.7.B2.	Describe how energy can be changed from one form to another (transformed) as it moves through a system or transferred from one system to another system.

Important Standards Addressed in the Unit:	
3.2.8.B6.	Explain how physics principles underlie everyday phenomena and important technologies

Misconceptions:	**Proper Conceptions:**
1. Current and voltage are the same thing. 2. Static electricity is not really electricity.	1. Current measures the amount of electrons flowing. Voltage measures the electrical push the electrons receive in order to move. 2. Static electricity is created when electrons "trapped" on an insulating surface "jump" to another substance in an effort to get to the ground

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Electricity is a force caused by negatively charged electrons. ● Electrons repel one another. ● Two types of electricity are "static" and "current." ● Current can flow in an alternating or direct pattern. ● Circuits help us control the flow of electrons. ● Generators create a flow of electrons.	● Differentiate between static and current electricity ● Classify substances in terms of their conductivity ● Differentiate between a motor and a generator ● Build, test, and draw series circuits ● Build, test, and draw parallel circuits ● Measure current, voltage, and resistance in the laboratory	● Precision in measurement using lab tools and equipment ● Communication and collaboration within lab groups ● Critical thinking regarding lab data ● Analyzation of lab data ● Creative use of science vocabulary to tell a story

Academic Vocabulary:		
● Electrons, electricity, charge, static electricity, current electricity, series circuit, parallel circuit, complex circuit, current, voltage, switch, load, source, conductor, semi-conductor, insulator, generator		

Assessments:

- Circuit building lab practical
- Motor/Generator lab challenge
- Paper plate speaker lab practical
- Electricity Unit Test

Differentiation:

- Assignments contain Advanced Requirements designed to allow students who process the material more quickly to complete analysis, application, and critical thinking using the content specific to each assignment.
- IEP and 504 Implementation as indicated per individual student.

Interdisciplinary Connections:

- Cite textual evidence to support analysis of science and technical texts - TDA using science article
- Industrial Revolution and effects of mass generation of electricity on society

Additional Resources:

- Videos to demonstrate lab techniques
- Screencasts of lecture notes
- Virtual labs provided by free access Internet sites
- Grade level science articles
- Lab "kits" created by teacher containing equipment and supplies specific to each lab activity

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