

**CARLISLE AREA SCHOOL DISTRICT**

**Carlisle, PA 17013**

**PHYSICAL SCIENCE**

**GRADE 8**

Date of Board Approval: February 16, 2017

**CARLISLE AREA SCHOOL DISTRICT  
PLANNED INSTRUCTION COVER PAGE**

<b>TITLE OF COURSE:</b>	Physical Science	<b>SUBJECT:</b>	Science	<b>GRADE LEVEL:</b>	8
<b>COURSE LENGTH:</b>	One Year	<b>DURATION:</b>	50 minutes	<b>FREQUENCY:</b>	6 days/cycle
<b>PREREQUISITES:</b>	N/A	<b>CREDIT:</b>	1	<b>LEVEL:</b>	N/A

**Course Description/Objectives:** The eighth grade science course is a year long course designed to provide students with a foundation for concepts in the nature of science, physics and chemistry. In this course, safety procedures, metric measurement, graphing skills and the scientific method will be reinforced. Students will be introduced to concepts including forces of motion, energy, properties of matter, atomic structure and chemical bonding.

**Text:** Physical Science, McGraw Hill 2012

**Curriculum Writing Committee:** Cathy Aungst                      Dan Hoy                      Susan Nealy  
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## COURSE TIME LINE

### **Unit 1: Safety (Essential)**

5 days

- Safety rules and guidelines
- Use of personal protective equipment (PPE) in the classroom
- Emergency procedures and equipment

### **Unit 2: Scientific Method (Important)**

12 days

- Scientific method
- Independent/dependent variables
- Experimental design

### **Unit 3: Measurement/Graphing (Important)**

19 days

- SI units
- Mass/volume/length/density
- Metric unit conversion
- Measurement equipment
- Components of a graph
- Types of graphs
- Constructing graphs
- Analyze and interpret graphs

### **Unit 4: Motion (Essential)**

18 days

- Speed and velocity
- Distance-time graphs
- Acceleration

## COURSE TIME LINE

### **Unit 5: Forces (Essential)**

18 days

- Types of force
- Newton's First Law
- Newton's Second Law
- Newton's Third Law
- Circular motion

### **Unit 6: Energy (Essential)**

20 days

- Law of Conservation of Energy
- Potential and kinetic energy
- Work
- Heat transfer
- Alternative energy

### **Unit 7: Simple Machines (Compact)**

8 days

- Types of machines
- Work and mechanical advantage

### **Unit 8: Matter (Essential)**

22 days

- States of matter
- Phase changes/Kinetic Molecular Theory
- Gas laws
- Composition of matter
- Physical and chemical properties/changes
- Laws of conservation of mass

## COURSE TIME LINE

### **Unit 9: Atomic Structure and the Periodic Table (Essential)**

27 days

- Structure of the atom
- Mass of atoms
- Structure and function of the Periodic Table
- Chemical formulas

### **Unit 10: Chemical Bonding (Compact)**

8 days

- Ionic bonding
- Covalent bonding
- Metallic bonding

Total: 157 days

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	5 days
<b>UNIT #1:</b>	Safety (Essential)	<b>GRADE:</b>	8

## STANDARDS:

### Common Core, PA Science and Technology Academic Standards, Eligible Content:

#### PA Science and Technology Academic Standards:

- S8.A.2.2.3      ● Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.
- S8.A.2.2.3      ● Describe ways technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purpose.

#### PA Common Core:

- CC.3.5.6-8D      ● 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.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	5 days
<b>UNIT #1:</b>	Safety (Essential)	<b>GRADE:</b>	8

## UNDERSTANDINGS

Students will learn to safely and properly use and manipulate scientific equipment, chemicals etc. in order to learn science and participate in inquiry activities.

## COMMON ASSESSMENTS/CULMINATING ACTIVITY

Safety test

### KNOW

- Understand guidelines and rules outlined in the safety contract.
- Define key vocabulary words: safety data sheets (SDS) and personal protective equipment (PPE).
- Identify the locations of safety equipment including personal protective equipment, fire blanket, eyewash, fire extinguisher and safety shower.

### DO

- Demonstrate various safety equipment used in case of an emergency.
- Achieve a passing grade for the safety contract quiz.
- Map the room (safety equipment locations).
- Establish a lab routine for the use of personal protective equipment (PPE).
- Demonstrate proper lab techniques that ensure safety.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	12 days
<b>UNIT #2:</b>	Scientific Method (Important)	<b>GRADE:</b>	8

## STANDARDS:

### Common Core, PA Science and Technology Academic Standards, Eligible Content:

#### PA Common Core Standards:

- CC.3.5.6-8C ● Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- CC.3.5.6-8H ● Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
- CC.3.6.6-8A ● Write arguments focused on discipline-specific content.
- CC.3.6.6-8B ● Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- CC.3.6.6-8C ● Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- CC.3.5.6-8D ● 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.

#### PA Science and Technology Academic Standards:

- 3.4.8.C1 ● Evaluate the criteria and constraints of a design.



# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	12 days
<b>UNIT #2:</b>	Scientific Method (Important)	<b>GRADE:</b>	8

## Eligible Content:

- S8.A.2.1.2 ● Use space/time relationships, define concepts operationally, raise testable questions, or formulate hypotheses.
- S8.A.2.1.3 ● Design a controlled experiment by specifying how the independent variables will be manipulated, how the dependent variable will be measured, and which variables will be held constant.
- S8.A.2.1.4 ● Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.
- S8.A.2.1.5 ● Use evidence from investigations to clearly communicate and support conclusions.
- S8.A.1.1.1 ● Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/information may change existing theories and practices.
- S8.A.1.1.2 ● Explain how certain questions can be answered through scientific inquiry and/or technological design.
- S8.A.1.1.3 ● Use evidence, such as observations or experimental results, to support inferences about a relationship.
- S8.A.1.1.4 ● Develop descriptions, explanations, predictions, and models using evidence.
- S8.A.1.3.3 ● Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	12 days
<b>UNIT #2:</b>	Scientific Method (Important)	<b>GRADE:</b>	8

<p><b>UNDERSTANDINGS</b></p> <p>Explain and apply elements of scientific research to solve problems.</p>	
<p><b>COMMON ASSESSMENTS/CULMINATING ACTIVITY</b></p> <p>Design your own lab</p>	
<p style="text-align: center;"><b>KNOW</b></p> <ul style="list-style-type: none"> <li>● Understand steps in the Scientific Method.</li> <li>● Identify components of a valid experiment: independent variable, dependent variable, control, constants, and lab safety</li> <li>● Formulate a valid conclusion based upon data acquired through experimentation.</li> <li>● Define key vocabulary words including theory, laws, hypothesis, independent and dependent variables, control, and constant.</li> </ul>	<p style="text-align: center;"><b>DO</b></p> <ul style="list-style-type: none"> <li>● Employ proper laboratory safety procedures.</li> <li>● Use appropriate tools and techniques to gather, analyze, and interpret data.</li> <li>● Be able to make accurate observations and inferences and distinguish between the two.</li> <li>● Generate and evaluate questions that can be studied in science.</li> <li>● Design and conduct an investigation with adequate control and limited variables.</li> <li>● Communicate experimental design, results, and conclusion in a written form.</li> </ul>

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	19 days
<b>UNIT #3:</b>	Measurement/Graphing (Important)	<b>GRADE:</b>	8

**STANDARDS: Common Core, PA Science and Technology Academic Standards, Eligible Content:**

**Common Core:**

- CC.3.5.6-8C ● Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- CC.3.6.6-8B ● Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- CC.3.5.6-9G ● 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).
- CC.3.5.6-8D ● 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.

**PA Science and Technology Academic Standards:**

- 3.2.8.A1 ● Differentiate between mass and weight.

**Eligible Content:**

- S8.C.1.1.2 ● Use characteristic physical or chemical properties to distinguish one substance from another (eg density, thermal expansion/contraction, freezing/melting points, streak test)
- S8.A.1.3.1 ● Use ratio to describe change (e.g., percents, parts per million, grams per cubic centimeter, mechanical advantage).
- S8.A.2.1.1 ● Use evidence, observations, or a variety of scales (e.g. mass, distance, volume, temperature) to describe relationships.  
● Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume or temperature under a variety of conditions.
- S8.A.2.2.2 ● Apply appropriate measurement systems (e.g. time, mass distance, volume, temperature) to record and interpret observations under varying conditions.
- S8.A.2.1.4 ● Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	19 days
<b>UNIT #3:</b>	Measurement/Graphing (Important)	<b>GRADE:</b>	8

<p><b>UNDERSTANDINGS</b></p> <p>Scientific measurement is based on the metric system.</p>	
<p><b>COMMON ASSESSMENTS/CULMINATING ACTIVITY</b></p> <p>Measurement test, graphing exercises</p>	
<p style="text-align: center;"><b>KNOW</b></p> <ul style="list-style-type: none"> <li>● Know how to measure distance, volume, and mass.</li> <li>● Apply the density equation: density = mass/volume.</li> <li>● Apply the volume equation: <math>V = l \times w \times h</math>.</li> <li>● Use proper components of a quality, scientific graph.</li> <li>● Correctly analyze and interpret graphs.</li> <li>● Define key vocabulary words including: title, X and Y axis, scale, key, legend, dependent variable, independent variable, graph forms, mass, grams, the Kelvin scale, derived units, meters, mL, liters, volume, density.</li> </ul>	<p style="text-align: center;"><b>DO</b></p> <ul style="list-style-type: none"> <li>● Select and use appropriate SI units for all measurements.</li> <li>● Convert a measurement among related SI units.</li> <li>● Use appropriate devices to collect data in various SI units, including volume, mass, distance, time, and temperature.</li> <li>● Calculate density using measures of volume and mass to distinguish between substances.</li> <li>● Differentiate between mass and weight.</li> <li>● Conduct a multistep experiment with a valid conclusion for each of the measurement labs.</li> </ul>

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	18 days
<b>UNIT #4:</b>	Motion (Essential)	<b>GRADE:</b>	8

## **STANDARDS:**

### **Common Core, PA Science and Technology Academic Standards, Eligible Content:**

#### **PA Common Core Standards:**

- CC.3.5.6-8C ● Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- CC.3.5.6-8G ● 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).
- CC.3.5.6-8D ● 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.

#### **PA Science & Technology Academic Standards:**

- 3.2.8.B6 ● Patterns: Explain how physics principles underlie everyday phenomena and important technologies.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	18 days
<b>UNIT #4:</b>	Motion (Essential)	<b>GRADE:</b>	8

## UNDERSTANDINGS

Students should understand changes in motion over time.

## COMMON ASSESSMENTS/CULMINATING ACTIVITY

Speed quiz, labs, test

### KNOW

- Calculate velocity ( $V = D/T$ ).
- Calculate acceleration ( $A = \Delta V/T$ ).
- Define key vocabulary words including: velocity, speed, acceleration, and motion.

### DO

- Calculate and graph the speed, velocity, and acceleration of objects.
- Analyze graphs showing velocity and acceleration.
- Collect speed data, plot on a graph and interpret.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	18 days
<b>UNIT #5:</b>	Forces (Essential)	<b>GRADE:</b>	8

## STANDARDS:

### Common Core, PA Science and Technology Academic Standards, Eligible Content:

#### PA Common Core Standards:

- CC.3.5.6-8C ● Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- CC.3.5.6-8G ● 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).
- CC.3.5.6-8D ● 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.

#### PA Science & Technology Academic Standards:

- 3.2.7.B1 ● Describe how unbalanced forces acting on an object change its velocity.
- 3.2.8.B6 ● Patterns: Explain how physics principles underlie everyday phenomena and important technologies.
- 3.2.8.A1 ● Differentiate between mass and weight.
- 3.2.8.B1 ● Explain how inertia is a measure of an object's mass. Explain how momentum is related to the forces acting on an object.

#### PSSA Eligible Content/Assessment Anchors:

- S8.C.3.1.1 ● Describe forces acting on objects (e.g., friction, gravity, balanced versus unbalanced).

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	18 days
<b>UNIT #5:</b>	Forces (Essential)	<b>GRADE:</b>	8

<p><b>UNDERSTANDINGS</b></p> <p>Students should understand how forces impact the world around them.</p>	
<p><b>COMMON ASSESSMENTS/CULMINATING ACTIVITY</b></p> <p>Labs, test</p>	
<p style="text-align: center;"><b>KNOW</b></p> <ul style="list-style-type: none"> <li>● Differentiate between the types of forces: balanced, net force, gravity (gravitational force), friction, and air resistance.</li> <li>● Define Newton’s three laws of motion.</li> <li>● Quantify force (<math>F = M \times A</math>).</li> <li>● Comprehend law of conservation of momentum.</li> <li>● Calculate momentum (<math>P = M/V</math>).</li> <li>● Define key vocabulary words including: terminal velocity, newton, momentum, inertia, net force, projectile motion, centripetal force, and Sir Isaac Newton.</li> </ul>	<p style="text-align: center;"><b>DO</b></p> <ul style="list-style-type: none"> <li>● Students should be able to differentiate between the varying forces.</li> <li>● Explain why net forces cause changes in motion. (Writing)</li> <li>● Describe how inertia is affected by outside forces. (Writing)</li> <li>● Demonstrate how momentum is transferred between objects in collisions by performing various experiments. (Thinking)</li> <li>● Identify action and reaction pairs.</li> </ul>



# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	20 days
<b>UNIT #6:</b>	Energy (Essential)	<b>GRADE:</b>	8

## STANDARDS:

### Common Core, PA Science and Technology Academic Standards, Eligible Content:

#### Common Core:

- CC.3.5.6-8C ● Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- CC.3.6.6-8A ● Write arguments focused on discipline-specific content.
- CC.3.6.6-8F ● 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.
- CC.3.5.6-8D ● 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.

#### PA Science and Technology Academic Standards:

- 3.2.8.B2 ● Identify situations where kinetic energy is transformed into potential energy, and vice versa.
- 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
- 3.2.8.B3 ● Explain how changes in temperature are accompanied by changes in kinetic energy.
- 3.2.7.B3 ● Differentiate among convection, conduction, and radiation. Explain why heat energy consists of the random motion and vibrations of the particles of matter.
- 3.2.7.B5 ● Demonstrate that visible light is a mixture of many different colors. Explain the construct of the electromagnetic spectrum. Describe how sound and light energies are transmitted by waves.
- 3.2.8.B6 ● Explain how physics principles underlie everyday phenomena and important technologies.
- 3.3.8.A2 ● Describe renewable and nonrenewable energy resources.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	20 days
<b>UNIT #6:</b>	Energy (Essential)	<b>GRADE:</b>	8

## Eligible Content:

- S8.C.2.1.1 ● Distinguish among forms of energy (e.g. electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (i.e. renewable and nonrenewable energy)
- S8.C.2.1.2 ● Explain how energy is transferred from one place to another through convection, conduction, or radiation.
- S8.C.2.1.3 ● Describe how one form of energy (e.g. electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy.
- S8.C.2.2.1 ● Describe the Sun as the major source of energy that impacts the environment.
- S8.C.2.2.2 ● Compare the time span of renewability of fossil fuels and the time span of renewability for alternative fuels.
- S8.C.2.2.3 ● Describe the waste (i.e. kind and quantity) derived from the use of renewable and nonrenewable resources and their potential impact on the environment.
- S8.C.3.1.2 ● Distinguish between kinetic and potential energy.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	20 days
<b>UNIT #6:</b>	Energy (Essential)	<b>GRADE:</b>	8

## UNDERSTANDINGS

There is a relationship between the different forms of energy and how energy is conserved by transferring among them.

Energy is used to do work through mechanical and non-mechanical systems.

## COMMON ASSESSMENTS/CULMINATING ACTIVITY

Energy project, test, labs

### KNOW

- Describe what energy is and how it is used to do work.
- Calculate work (work formula:  $W = F \times D$ ).
- Express how energy is conserved and transferred.
- Differentiate the forms of energy including: mechanical, electrical, chemical, radiant, thermal, nuclear, sound, renewable and nonrenewable.
- Categorize methods of heat transfer and retention.
- Define key vocabulary words including: renewable, nonrenewable, potential energy, kinetic energy, conduction, convection, radiation, insulation, specific heat, and radioactivity.

### DO

- Differentiate between potential and kinetic energy.
- Use scientific inquiry to obtain measurements in order to calculate kinetic and potential energy.
- Distinguish between methods of heat transfer and how proper insulation can lessen heat loss.
- Illustrate energy transfer among objects using the seven main forms of energy.
- Calculate work.
- Explain the uses of different energy sources and apply to real world situations.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	8 days
<b>UNIT #7:</b>	Simple Machines (Compact)	<b>GRADE:</b>	8

## STANDARDS:

### PA Core Standards, PA Academic Standards, PSSA Eligible Content/Assessment Anchors:

#### PA Core Standards:

CC.3.5.6-8C

- Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CC.3.5.6-8D

- 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.

#### Eligible Content:

S8.C.3.1.3

- Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g., simple machines, hydraulic systems).

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	8 days
<b>UNIT #7:</b>	Simple Machines (Compact)	<b>GRADE:</b>	8

## UNDERSTANDINGS

Simple machines multiply your force making the work easier to do, but it does not change the overall amount of work required.

## COMMON ASSESSMENTS/CULMINATING ACTIVITY

Simple machine inquiry based activities, Study Island

### KNOW

- Understand that work is the transfer of energy when a force is applied through a distance.
- Understand and define mechanical advantage.
- Calculate mechanical advantage forces ( $MA = \text{output force}/\text{input force}$ ).
- Calculate mechanical advantage with distance ( $MA = \text{input distance}/\text{output distance}$ ).
- Identify and understand the types of simple machines including: levers, pulleys, inclined planes, screw, wheel and axle, and wedge.
- Define key vocabulary words including: lever, pulleys, inclined planes, screw, wheel and axle, wedge, mechanical advantage, work, input force, and output force.

### DO

- Identify the different simple machines and their uses.
- Calculate work and mechanical advantage. Explain the relationship between mechanical advantage and distance/direction of force.
- Use simple machines to perform inquiry based activities.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	22 days
<b>UNIT #8:</b>	Matter (Essential)	<b>GRADE:</b>	8

## STANDARDS:

### Common Core, PA Science and Technology Academic Standards, Eligible Content:

#### Common Core:

- CC.3.5.6-8C ● Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- CC.3.5.6-8G ● 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).
- CC.3.5.6-8D ● 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.

#### PA Science and Technology Academic Standards:

- 3.2.7.A1 ● Differentiate between elements, compounds, and mixtures. Identify groups of elements that have similar properties. Explain how materials are characterized by having a specific amount of mass in each unit of volume (density).
- 3.2.8.A3 ● Explain how changes in matter are accompanied by changes in energy.
- 3.2.8.A4 ● Compare and contrast physical and chemical changes in terms of products.

#### Eligible Content:

- S8.C.1.1.1 ● Explain the differences among elements, compounds, and mixtures.
- S8.C.1.1.2 ● Use characteristic physical or chemical properties to distinguish one substance from another (e.g. density, thermal expansion/contraction, freezing/melting points, streak test).
- S8.A.1.3.2 ● Use evidence, observations, or explanations to make inferences about change in systems over time (e.g. carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	22 days
<b>UNIT #8:</b>	Matter (Essential)	<b>GRADE:</b>	8

## UNDERSTANDINGS

Students will be able to explain concepts about the structure and properties of matter.

## COMMON ASSESSMENTS/CULMINATING ACTIVITY

Labs, quizzes, tests

### KNOW

- Integrate kinetic molecular theory into the states of matter and the phase changes.
- Categorize compositions of matter.
- Differentiate physical and chemical properties and changes.
- Define key vocabulary words including: kinetic molecular theory, sublimation, phase changes, Archimedes, heterogeneous, homogeneous, solution, colloid, suspension, Tyndall effect, law of conservation of mass and density.

### DO

- Describe the physical states and properties of matter according to the kinetic molecular theory.
- Differentiate between physical and chemical properties and physical and chemical changes.
- Differentiate between compounds and mixtures.
- Use inquiry based activities to study matter.
- Complete a written analysis for each of our labs on matter.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	27 days
<b>UNIT #9:</b>	Atomic Structure and Periodic Table (Essential)	<b>GRADE:</b>	8

## STANDARDS:

### Common Core, PA Science and Technology Academic Standards, Eligible Content:

#### PA Common Core:

- CC.3.5.6-8G ● 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).
- CC.3.5.6-8D ● 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.

#### Science and Technology:

- 3.2.7.A1 ● Differentiate between elements, compounds, and mixtures. Identify groups of elements that have similar properties. Explain how materials are characterized by having a specific amount of mass in each unit of volume (density).
- 3.2.8.A2 ● Identify characteristics of elements derived from the periodic table.
- 3.2.7.A2 ● Identify atoms as the basic building blocks of matter and that elements are composed of one type of atom.
- 3.2.7.A4 ● Describe how reactants change into products in simple chemical reactions.

#### Eligible Content:

- S8.A.3.2.1 ● Describe how scientists use models to explore relationships in natural systems (e.g. an ecosystem, river system, the solar system).
- S8.A.3.3.2 ● Describe repeating structure patterns in nature (e.g. veins in a leaf, tree rings, crystals, water waves) or periodic patterns (e.g. daily, monthly, and annually).
- S8.C.1.1.3 ● Identify and describe reactants and products of simple chemical reactions.



# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	27 days
<b>UNIT #9:</b>	Atomic Structure and Periodic Table (Essential)	<b>GRADE:</b>	8

## UNDERSTANDINGS

Atoms are the basic building blocks of matter and are made of the same subatomic particles.  
The Periodic Table is a systematic arrangement of the elements.

## COMMON ASSESSMENTS/CULMINATING ACTIVITY

Labs, tests, quizzes, develop atomic models

### KNOW

- Reiterate history of atomic theory.
- Comprehend structure and arrangement of the atom.
- Define important vocabulary words including: nucleus, electron cloud/energy levels, protons, neutrons, electrons, and quarks.
- Identify atomic numbers and chemical symbols of selected common elements.
- Recognize atomic mass and describe how it is determined.
- Determine the arrangement of periodic table of elements and review its history.
- Compose diagrams showing valance electrons.
- Identify metals, non-metals, metalloids, noble gases, halogens, Mendeleev, Mosley, periodicity, valence electrons, transition metals, alpha and beta particles, gamma rays, half-life, and isotopes.

### DO

- Construct an atomic model with the correct structure and placement of atomic particles.
- Calculate the number of neutrons based on an isotope's mass number.
- Use the key of periodic table to find information about the elements.
- Identify elements based on their atomic number or symbol.
- Explain the reasons behind the arrangement of the periodic table.
- Use the periodic table to classify elements in different ways.
- Explain the characteristics and properties of the families on the Periodic Table.
- Investigate atomic structure using models.
- Draw dot diagrams to illustrate valance electrons.
- Demonstrate half-life using a manipulative such as pennies.
- Describe different forms of radioactivity.
- Read and write chemical formulas.
- Balance chemical equations.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	8 days
<b>UNIT #10:</b>	Chemical Bonding (Compact)	<b>GRADE:</b>	8

## STANDARDS:

### PA Common Core Standards, PA Science and Technology Academic Standards:

#### PA Core Standards:

CC.3.5.8D

- 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.

#### PA Science and Technology Academic Standards:

3.2.A2

- Explain how atoms combine to form compounds through both ionic and covalent bonding. Predict chemical formulas based on the number of valence electrons. Draw Lewis dot structures for simple molecules and ionic compounds. Predict the chemical formulas for simple ionic and molecular compounds.

3.2.10.A2

- Compare and contrast different bond types that result in the formation of molecules and compounds.

# KNOW, UNDERSTAND, DO

<b>COURSE:</b>	Physical Science	<b>TIME FRAME:</b>	8 days
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## UNDERSTANDINGS

The electron configuration and location on a periodic table affects the type of bond an element will form.  
The goal of chemical bonding is to stabilize atoms.

## COMMON ASSESSMENTS/CULMINATING ACTIVITY

Labs, tests, quizzes

### KNOW

- Distinguish between the types of chemical bonds (ionic, covalent).
- Analyze how valence numbers determine chemical bonding.
- Define key vocabulary terms including: polar and non-polar molecules, ions, and oxidation.
- Define the goal of chemical bonding is to stabilize atoms.

### DO

- Differentiate between an element and a compound.
- Determine which type of chemical bond occurs between elements.

## **Adaptations/Modifications for Students with I.E.P.s**

Adaptations or modifications to this planned course will allow exceptional students to earn credits toward graduation or develop skills necessary to make a transition from the school environment to community life and employment. The I.E.P. team has determined that modifications to this planned course will meet the student's I.E.P. needs.

Adaptations/Modifications may include but are not limited to:

### **INSTRUCTION CONTENT**

- Modification of instructional content and/or instructional approaches
- Modification or deletion of some of the essential elements

### **SETTING**

- Preferential seating

### **METHODS**

- Additional clarification of content
- Occasional need for one to one instruction
- Minor adjustments or pacing according to the student's rate of mastery
- Written work is difficult, use verbal/oral approaches
- Modifications of assignments/testing
- Reasonable extensions of time for task/project completion
- Assignment sheet/notebook
- Modified/adjusted mastery rates
- Modified/adjusted grading criteria
- Retesting opportunities

### **MATERIALS**

- Supplemental texts and materials
- Large print materials for visually impaired students
- Outlines and/or study sheets Carbonless notebook paper
- Manipulative learning materials
- Alternatives to writing (tape recorder/calculator)