DELAWARE VALLEY SCHOOL DISTRICT

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Science 8

Grade Level: 8

Date of Board Approval: 2019

Planned Instruction

Title of Planned Instruction:

Subject Area: General Science Grade(s): 8

Course Description:

This course is designed to give students a general understanding of the concepts of Physics and Chemistry. The students will use problem solving skills, data analysis, critical thinking and process skills to solve problems in these scientific areas.

The students will also incorporate Language Arts skills such as reading of technical text, magazine and journal articles, and word dissection to understand complex science vocabulary. They will also incorporate math skills such as graphing, Algebraic equation manipulation, setting up data tables and order of operations.

The students will incorporate technology into the class. Students will use computers to enhance the learning process. They will set up data tables and use them to graph their results. They will also use computers to do research into various topics in science.

Time/Credit for the Course: 1 year

Curriculum Writing Committee: Mark Alderfer, Jessica Gregorski, Alyssa Tomaskovic

Curriculum Map

- **Marking Period One: 40-45 days**

  - **Overview based on 45 days:** Students will gain an understanding of motion through exploration of forces, friction and air resistance followed up with Newton's laws of motion, gravity and momentum and kinetic and potential energy. Students will also gain and understanding of simple machines and how they relate to work and power.

  - **Science Fusion: Motion, Forces, and Energy**
    i. **Unit One: Motion and Forces**
    ii. **Unit Two: Work, Energy, and Machines**

  - **Goals:**
    Understanding of:
    i. Forces in motion
    ii. Balanced and Unbalanced Forces
    iii. Friction
    iv. Air Resistance
    v. Newton's three laws of motion
    vi. Inertia
    vii. Gravity
    viii. Momentum
    ix. Mathematical formulas in accordance to Newton's second law of motion, force of gravity, weight and mass, and momentum.
    x. Proper use of SI units when calculating the variables for the formulas listed above.
    xi. Energy
    xii. Kinetic vs. Potential Energy
    xiii. The Law of Conservation of Energy
    xiv. Work and Power
    xv. Calculating Work and Power with proper units.
    xvi. Simple Machines
    xvii. Ideal Machines
    xviii. Mechanical Advantage
    xix. Mechanical Efficiency
    xx. Calculating Mechanical Advantage and Efficiency using the proper units.
    xxi. Six types of simple machines

- **Marking Period Two: 40-45 days**

    - **Overview based on 45 days:** Students will understand that the electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel. Students will gain an understanding of the metric system and its use and reinforce the scientific method.

    - **Science Fusion: Motion, Forces, and Energy**
        i. **Unit Three: Magnets, Magnetism, and Electromagnetism**
        ii. **Unit Four: The Nature of Science**
        iii. **Unit Five: Matter (Lessons 1-3)**

    - **Goals:**
      Understanding of:
        i. **Magnets and magnetic fields**
        ii. **The relationship between electricity and magnetism**
        iii. **The steps of the scientific method**
        iv. **Control and variables**
        v. **Independent and dependent variables**
        vi. **Metric prefixes and suffixes**
        vii. **Conversions within the metric system**
        viii. **Relationship between mass, weight, volume, and density**
        ix. **Physical versus chemical properties**
        x. **Physical versus chemical changes**

- **Marking Period Three: 40-45 days**

    - **Overview based on 45 days:** Students will explore the property of magnetism and related the relationship between electricity and magnetism. Students will then learn about the scientific method and apply it in various settings. Students can explain concepts about the structure and properties (physical and chemical) of matter. Students will use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test). Students will understand that matter is described by its properties and ability to undergo changes.

    - **Science Fusion: Matter and Energy**
        i. **Unit One: Matter (Lessons 4-6)**
        ii. **Unit Two: Energy**

    - **Goals:**
      Understanding of:

i. **Matter**
ii. **Calculating mass, volume, density and water displacement**
iii. **Classifying and comparing substances based upon physical and chemical properties**
iv. **Differences between physical and chemical properties**
v. **Law of Conservation of Mass**
vi. **Differences between pure substances and mixtures**
vii. **Classifying elements, compounds and mixtures**

- **Marking Period Four (40-45 days)**

  - **Science Fusion: Matter and Energy**
    i. **Unit 3: Atoms and the Periodic Table**

  - **Overview based on 45 days:** Students will gain an understanding of the concepts of the structure and parts of the atom. Students will gain and understanding of the nomenclature used for the identification of atoms. Students will gain an understanding of the periodic table of elements. Students will conclude the marking period by gaining an understanding of chemical bonds.

  - **Goals:**
    Understanding of:
    i. **Structure of the atom.**
    ii. **Components of the atom.**
    iii. **Scientific Nomenclature**
    iv. **Atomic Models**
    v. **Isotopes**
    vi. **Periodic Table of Elements**
    vii. **Chemical Bonds**
    viii. **Chemical Formulas**
    ix. **Types of Chemical Bonds**
    x. **Compounds**
    xi. **Chemical Changes**
    xii. **Chemical Equations**

Curriculum Plan

Unit 1: Motion & Forces (Lessons 1 - 4) **Marking Period: 1**
Science Fusion I: Motion, Forces and Energy

Standard(s): PA Academic Standards, PACCS English/Language Arts
3.2.7.A, 3..2.7. B1, CC.3.5.6-8.B, CC.3.5.6-8.C, CC.3.5.6-8.D, CC.3.5.6-8.E, CC.3.5.6-8.F, CC.3.5.6-8.G, CC.3.5.6-8.H, CC.3.5.6-8.I, CC.3.5.6-8.J
http://www.pdesas.org/CMap/CFramework

Anchor(s): S8.C.3.1, S.8.D.3.1, S8.A.1.1, S8.A.1.2, S8.A.2.2, M8.A.2.1, M8.D.4.1
http://static.pdesas.org/content/documents/CF-Science_MS_PhysicalScience.pdf

Big Idea(s): Unbalanced forces cause changes in the motion of objects, and these changes can be predicted and described.

Essential Questions:
- How are distance, time, and speed related?
- How does motion change?
- How do forces affect motion?
- How do objects move under the influence of gravity?
- What happens when fluids exert pressure?

Concepts:
- Students will describe and explain the effects of balanced and unbalanced forces on motion as found in real-life phenomena.
- Objects change their motion only when a net force is applied.
- Newton's Laws of Motion are used to describe the effects of forces on the motion of objects.

Competencies:
Students will be able to:
- To analyze how distance, time and speed are related.
- To analyze how acceleration is related to time and velocity.
- To describe different types of forces and explain the effect force has on motion.
- To deserve the effect that gravity, including Earth's gravity, has on matter.
- To explain why fluids exert pressure and how the resulting pressure causes motion and the buoyant force.

Overview: Throughout this unit students will gain an understanding of when an object is moving or not moving. Students will be able to identify the characteristics of when an object is moving. Once students establish that an object is moving, they will be able to describe how the object is moving. Students will measure the motion of everyday objects around them and quantify the motion using appropriate scientific measuring units. Students will also display their obtained

data in a manner that is appropriate and easy to understand. Finally, students will apply their knowledge of motion to objects they would not normally describe.

Goals: For students to build a solid body of knowledge about the laws that govern space, time, forces, motion, matter and energy and their interactions. For students to be able to apply those principles of physics to everyday, real world situations in a way that is meaningful and helpful to their lives. For students to form a solid foundation of basic principles of physics to better prepare them for success on 8th grade Science PSSA tests as well as future higher level courses in Physics.

Objectives:

- Distinguish between distance and displacement. (DOK level – 2)
- Calculate average speed. (DOK level – 1)
- Explain the difference between speed and velocity. (DOK level – 1)
- Interpret motion graphs. (DOK level – 2)
- Identify how acceleration, time, and velocity are related. (DOK level – 1)
- Describe how to calculate the average acceleration of an object. (DOK level – 1)
- Analyze data using the various types of graphs. (DOK level – 4)
- Identify frames of reference and describe how they are used to measure motion (DOK: Level 1)
- Identify appropriate SI units for measuring distances (DOK: Level 1)
- Distinguish between distance and displacement (DOK: Level 2)
- Calculate displacement using vector addition (DOK: Level 2)
- Identify appropriate SI units for measuring speed (DOK: Level 1)
- Compare and contrast instantaneous speed and average speed (DOK: Level 2)
- Interpret distance time graphs (DOK: Level 2)
- Calculate the speed of an object using slopes (DOK: Level 2)
- Describe how velocities combine (DOK: Level 1)
- Identify changes in motion that produce acceleration (DOK: Level 1)
- Describe examples of constant acceleration (DOK: Level 1)
- Calculate the acceleration of an object (DOK: Level 2)
- Interpret speed time and distance time graphs (DOK: Level 2)
- Classify acceleration as positive or negative (DOK: Level 2)
- Describe instantaneous acceleration (DOK: Level 1)
- Describe examples of force (DOK: Level 1)
- Identify appropriate SI units used to measure force (DOK: Level 1)
- Explain how the motion of an object is affected when balanced and unbalanced forces are acting on it (DOK: Level 1)
- Compare and contrast the four kinds of friction (DOK: Level 2)
- Describe how Earth's gravity and air resistance affect falling objects (DOK: Level 1 & 2)

- Describe the path of a projectile (DOK: Level 2)
- Identify the forces that produce projectile motion (DOK: Level 1)
- Describe Newton's first law of motion and how it relates to inertia (DOK: Level 1 & 2)
- Describe Newton's second law of motion and use it to calculate acceleration, force and mass (DOK: Level 1 & 2)
- Relate the mass of an object to its weight (DOK: Level 2)
- Explain how action and reaction forces are related according to Newton's third law of motion (DOK: Level 2)
- Calculate the momentum of an object and describe what happens when momentum is conserved during a collision (DOK: Level 2)
- Identify the forms of electromagnetic force that can both attract and repel (DOK: Level 1)
- Define Newton's law of universal gravitation and describe the factors affecting gravitational force (DOK: Level 1)

Core Activities and Corresponding Instructional Methods: For each chapter included in this unit of study, the teacher should present all pertinent information found under the concepts section of this unit in a way that aid in not only retention, but mastery of all key concepts and mandatory vocabulary for this unit of instruction. Some suggested means of presenting this information are PowerPoint notes, cloze notes format, skeleton outlines, and student generated notes that are taken during a teacher presentation.

Assessments:

- **Diagnostic:**
  - Pre-assessments
  - Class Discussions
  - Oral Responses
  - Homework
  - Teacher Observations
- **Formative:**
  - Lesson Quizzes
  - Graded Homework Assignments
  - Laboratory Reports
  - Short Opened Ending Assignments
- **Summative:**
  - Unit Quizzes
  - Major Assessments
  - PSSA Aligned Short Open Ended Assessments

Extensions: Optional recommended Inquiry Labs and Digital Path interactive multimedia practice opportunities. Students can apply all methods for measuring and describing the motion of common objects to other objects. Students will select or construct accurate and appropriate representations for motion (visual, graphical, and mathematical); defend conclusions/ explanations about the motion of objects and real – life. Students will create a book that illustrates Newton's Laws of Motion. Students will demonstrate their understanding of Newton's three laws through illustrations and text. The quality of the illustrations/images and overall quality of the presentation will be evaluated as part of their grade. A rubric will be used to evaluate the project and should help guide you in its development. (See Appendix C)

Correctives:

- Students can practice calculating speed, average speed and acceleration through mathematical problems.
- Calculating Unit Mathematical Applications
- Make use of vocabulary building study skills (flashcards, foldables, crossword puzzles) Give students extra practice on all concepts covered within this unit Reteach and retest concepts
- Unit Pretests/Posttests
- Lesson Quizzes
- Alternative Assessment
- Performance-Based Assessments
- Unit Review
- Unit Tests
- End-of-Module Tests

Materials and Resources:

- Primary Textbook : Science Fusion Module: Motion, Force and Energy, Grades 6-8. Houghton Mifflin Harcourt , 2017
- Supplemental assignments and activities
- SAS Website http://www.pdesas.org/CMap/CFramework
- Various websites and online resources https://static.pdesas.org/content/documents/Science_Grade_8_Assessment_Anchors_and_Eligible_Content.pdf

Curriculum Plan

Unit: 2: Work, Energy and Machines **Marking Period: 1**

Science Fusion I: Motion, Forces and Energy

Standard(s): PA Academic Standards, PACCS English/Language Arts
3.1.7A1, 3.2.7.B, 3.2.8.B1 CC.3.5.6-8.B, CC.3.5.6-8.C, CC.3.5.6-8.D, CC.3.5.6-8.E, CC.3.5.6-8.F, CC.3.5.6-8.G, CC.3.5.6-8.H, CC.3.5.6-8.I, CC.3.5.6-8.J
http://www.pdesas.org/CMap/CFramework

Anchor(s): S7.C.2, S8.C.3.1, S8.C.3.1.1, S8.C.3.1.2, S8.C.3.1.3
http://static.pdesas.org/content/documents/CF-Science_MS_PhysicalScience.pdf

Big Idea(s): Every change that occurs requires energy. Machines make work easier by changing the force needed to do the work.

Essential Questions:
- How is work related to energy?
- What are kinetic and potential energy?
- How do simple machines work?

Concepts:
- Work is the use of force to move an object a distance.
- Work is only done if the force or part of the force acts in the same direction as the motion of an object.
- Work is force multiplied by distance.
- Energy is the ability to do work.
- Power is the rate at which work is done. It is also the rate at which energy is converted from one form to another.
- Power equals energy divided by time.
- Power is measured in watts (W).
- Kinetic Energy is the energy of motion.
- KE = (½)mv2
- Potential energy is stored energy due to an object's position, condition, or chemical composition

Competencies:
Students will be able to:
- To relate work to energy and power
- To calculate kinetic and potential energy and know how these two types of energy are related

- To describe different types of simple machines and to calculate the mechanical advantages and efficiencies of various simple machines

Overview: Throughout this unit students will acquire an understanding of energy and how energy is applied to everything that is experiencing a change. By the end of this unit, students will be able to distinguish between kinetic and potential energies, calculate kinetic and potential energy quantities, and identify transformations of energy within a system. Student will apply their knowledge of forces and moving objects every time they use an object or simple machine from writing with a pencil, to flipping a light switch, opening a door, or sweeping with a broom. By the end of this unit students will understand how the forces they apply to machines are changed and used to make objects move.

Goals: For students to build a solid body of knowledge about energy and energy transformations. Students will master all studied vocabulary in association with this unit. Students will be able to distinguish between the different forms of kinetic and potential energy. When given the formulas for KE and GPE students will be able to correctly complete calculations. Students will be able to apply those principles of physics to everyday, real world situations in a way that is meaningful and helpful to their lives. For students to form a solid foundation of basic principles of physics to better prepare them for success on 8th grade Science PSSA tests as well as future higher level courses in Physics.

Objectives:

- Calculate the work done on an object (DOK: Level 2)
- Describe and calculate power (DOK: Level 2)
- Describe what a machine is and how it makes work easier to do (DOK: Level 1 & 2)
- Relate the work input of a machine to the work output of the machine (DOK: Level 2)
- Compare a machine's actual mechanical advantage to its ideal mechanical advantage (DOK: Level 1)
- Calculate ideal and actual mechanical advantages of various machines (DOK: Level 2)
- Explain why the efficiency of a machine is always less than 100 percent (DOK: Level 1)
- Calculate a machine's efficiency (DOK: Level 2)
- Name, describe, and give an example of each of the six types of simple machines (DOK: Level 1 & 2)
- Describe how to determine the ideal mechanical advantage of each type of simple machine (DOK: Level 1)
- Define and identify compound machines (DOK: Level 1)
- Describe the relationship between work and energy (DOK: Level 2)
- Relate kinetic energy to mass and speed and calculate these quantities (DOK: Level 2)

- Analyze how potential energy is related to an object's position and give examples of gravitational potential and elastic potential energy (DOK: Level 4)
- Solve equations that relate an object's gravitational potential energy to its mass and height (DOK: Level 2)
- Give examples of the major forms of energy and explain how each is produced (DOK: Level 1)
- Describe conversions of energy from one form to another (DOK: : Level 1)
- State and apply the law of conservation of energy (DOK: Level 1 & 4)
- Analyze how energy is conserved in conversions between kinetic energy and potential energy and solve equations that equate initial energy to final energy (DOK: Level 4)
- Describe the relationship between energy and mass and calculate how much energy is equivalent to a given mass (DOK: Level 1 & 2)

Core Activities and Corresponding Instructional Methods:

Assessments:

- **Diagnostic:**
  - Pre-assessments
  - Class Discussions
  - Oral Responses
  - Homework
  - Teacher Observations
- **Formative:**
  - Lesson Quizzes
  - Graded Homework Assignments
  - Laboratory Reports
  - Short Opened Ending Assignments
- **Summative:**
  - Unit Quizzes
  - Major Assessments
  - PSSA Aligned Short Open Ended Assessments

Extensions: Optional recommended Inquiry Labs and Digital Path interactive multimedia practice opportunities. Students can apply all methods for measuring and describing the motion of common objects to other objects. Students will select or construct accurate and appropriate representations for motion (visual, graphical, and mathematical); defend conclusions/ explanations about the motion of objects and real – life.

Correctives:

- Students can practice calculating energy, work and power through mathematical word problems.
- Calculating unit mathematical applications
- Make use of vocabulary building study skills (flashcards, foldables, crossword puzzles)
- Give students extra practice on all concepts covered within this unit
- Reteach and retest concepts
- Unit Pretests/Posttests
- Lesson Quizzes
- Alternative Assessment
- Performance-Based Assessments
- Unit Review
- Unit Tests
- End-of-Module Tests

Materials and Resources:

- Primary Textbook : Science Fusion Module: Motion, Force and Energy, Grades 6-8. Houghton Mifflin Harcourt , 2017
- Supplemental assignments and activities
- SAS Website http://www.pdesas.org/CMap/CFramework
- Various websites and online resources https://static.pdesas.org/content/documents/Science_Grade_8_Assessment_Anchors_and_Eligible_Content.pdf

Curriculum Plan

Unit: 3: Magnets, Magnetism and Electromagnetism (Lesson 4 & 5) **Marking Period: 2**
Science Fusion I: Motion, Forces and Energy

Standard(s): PA Academic Standards, PACCS English/Language Arts
S8.C.3.1 3.2.7.A, 3..2.7. B1, CC.3.5.6-8.B, CC.3.5.6-8.C, CC.3.5.6-8.D, CC.3.5.6-8.E,

CC.3.5.6-8.F, CC.3.5.6-8.G, CC.3.5.6-8.H, CC.3.5.6-8.I, CC.3.5.6-8.J
http://www.pdesas.org/CMap/CFramework

Anchor(s): S8.C.3.1, S.8.D.3.1
http://static.pdesas.org/content/documents/CF-Science_MS_PhysicalScience.pdf

Big Idea(s): Interactions between any two objects can cause changes in one or both of them. An electric current can produce a magnetic field, and a magnetic field can produce an electric current.

Essential Questions:
- What makes something electrically charged?
- What is magnetism?
- What is electromagnetism?

Concepts:
- Electric current is the rate at which electric charges pass a given point.
- Opposite charges attract while like charges repel.
- Opposition to the flow of electric charge is called resistance.
- Students will understand that the electric force is a universal force that exists between any two charged objects.

Competencies:
Students will be able to:
- To describe basic electric circuits and how to use electricity safely.
- To describe magnets and magnetic fields and explain their properties
- To describe the relationship between electricity and magnetism and how this relationship affects our world.
- Electricity and magnetism are two aspects of a single electromagnetic force.
- Moving electric charges produce magnetic forces or “fields”, and moving magnets produce electric forces or “fields”.

Overview: During this overview unit on magnets, magnetism, and electromagnetism, students will learn about the concept of magnetic forces and the properties they demonstrate. They will explore how earth generates its own magnetic field. Students will also relate the idea of electricity to magnetism within the idea of electromagnetism while studying its applications.

Goals: Students will identify factors within the Force and Motion domain, forces acting in nature such as electricity, and magnetism are explored. Students investigate and explain the relationship between electric currents and magnets and demonstrate the advantages and disadvantages of series and parallel circuits. Students may complete PhET simulations or similar simulations where students work through the construction of series and parallel circuits using the simulators and asks them to record any observations.
https://phet.colorado.edu/en/simulation/circuit-construction-kit-dc

Objectives:

- Describe the nature of electric forces between two charged objects.
- Distinguish between an electrical conductor and an electrical insulator.
- Describe electric current.
- Compare direct to alternating current, and describe some everyday devices that use each.
- Describe voltage and its relationship to electric current.
- Describe factors that can affect resistance.
- Describe the properties of magnets.
- Explain what magnetic poles and magnetic fields are.
- Describe how magnets attract to repel.
- Explain what causes magnetic field and magnetism.
- Tell what some materials are magnetic and some are not.
- Tell how domains can cause materials to be magnetic.
- Distinguish between different types of magnets based on their magnetic properties.
- Tell how Earth acts as a magnet.
- Tell how Earth's geographic and magnetic pole differ.
- Describe electromagnetism.
- Describe what an electromagnet is and how one is constructed.
- Describe some ways in which electromagnets are used everyday life.
- Explain how a magnetic field can make an electric current through induction.

Core Activities and Corresponding Instructional Methods:

Assessments:

- **Diagnostic:**
  - Pre-assessments
  - Class Discussions
  - Oral Responses
  - Homework
  - Teacher Observations
- **Formative:**
  - Lesson Quizzes
  - Graded Homework Assignments
  - Laboratory Reports
  - Short Opened Ending Assignments
- **Summative:**
  - Unit Quizzes
  - Major Assessments
  - PSSA Aligned Short Open Ended Assessments

Extensions: Optional recommended Inquiry Labs and Digital Path interactive multimedia practice opportunities. Students may use the PhET Magnets and Electromagnets simulation to learn the goals through an inquiry approach. Students will be able to predict the direction of the magnet field for different locations around a bar magnet and electromagnet.Compare and contrast bar magnets and electromagnets. Identify the characteristics of electromagnets that are variable and what effects each variable has on the magnetic field strength and direction. Relate magnetic field strength to distance quantitatively and qualitatively..Compare and contrast the fields of gravity and magnets qualitatively. (See Appendix D)
https://phet.colorado.edu/en/simulation/legacy/magnets-and-electromagnets

Correctives:

- Students can practice calculating energy, work and power through mathematical word problems.
- Calculating Unit Mathematical Applications
- Make use of vocabulary building study skills (flashcards, foldables, crossword puzzles) Give students extra practice on all concepts covered within this unit Reteach and retest concepts
- Unit Pretests/Posttests
- Lesson Quizzes
- Alternative Assessment
- Performance-Based Assessments
- Unit Review
- Unit Tests

- End-of-Module Tests

Materials and Resources:

- Primary Textbook: Science Fusion Module: Motion, Force and Energy, Grades 6-8. Houghton Mifflin Harcourt , 2017
- Supplemental assignments and activities
- SAS Website http://www.pdesas.org/CMap/CFramework
- Various websites and online resources https://static.pdesas.org/content/documents/Science_Grade_8_Assessment_Anchors_and_Eligible_Content.pdf

Curriculum Plan

Unit: 4: The Nature of Science **Marking Period: 2**

Standard(s): PA Academic Standards, PACCS English/Language Arts
3.2.7.A; 3.2.7.B1, 3.2.7.B2, 3.2.7.B3, 3.2.7,B6, CC.3.5.6-8.B, CC.3.5.6-8.C, CC.3.5.6-8.D, CC.3.5.6-8.E, CC.3.5.6-8.F, CC.3.5.6-8.G, CC.3.5.6-8.H, CC.3.5.6-8.I, CC.3.5.6-8.J
http://www.pdesas.org/CMap/CFramework

Anchor(s): S8.A.1.1; S8.A.2.1; S8.A.2.2; S8.A.3.2; S.8.C.3.1
http://static.pdesas.org/content/documents/CF-Science_MS_PhysicalScience.pdf

Big Idea(s): Throughout this unit students will gain knowledge and experience for how to utilize scientific thinking and practice skills for experimenting. Review and reinforcement of measuring data, formulating and carrying out a design plan, and observing and analyzing data will allow students the needed practice for future laboratory preparedness. Through experiences with hands-on learning opportunities, students will attain an understanding of the importance of careful measurements, as well as design and execution of controlled experiments to demonstrate "good" science practices.

Essential Questions:

- What is science and scientific inquiry?
- What qualifies a question or problem as a testable question which you can perform an experiment on?
- What are the steps that scientists use to solve problems and answer scientific questions?
- What are the essential components of a controlled experiment?
- How can scientists collect essential data?
- How can we effectively analyze and interpret experimental data?
- What tools can be used for carrying out successful experiments
- How can we make accurate and precise measurements?

Concepts:

- Scientific theories are well tested conclusions that attempt to answer a specific scientific question that still have some flaws.
- Scientific laws are scientific conclusions or answers to scientific questions that are tested many times by many different scientists and are proven or strongly supported to be true.
- The basic steps in the scientific method are:
    - Ask a question
    - Gather information from research
    - Form a hypothesis

    - Perform an experiment
    - Record and analyze data
    - Form a conclusion
- There are three types of variables in a scientific experiment:
    - Controlled variables
    - Independent variables
    - Dependent variables
- There are two different types of data that a scientist can collect, record and analyze:
    - Qualitative Data
    - Quantitative Data
- Observations should be meaningful and objective.
- Physics and Chemistry both involve the transfer of energy and the study of the interactions of parts.
- Chemistry is a study of these things on a small scale and physics is a larger scaled version of this.
- Earth and space science are the application of physical and chemical principles on the grandest of scales.

Competencies:
Students will be able to:

- Discuss the scientific problem solving model in an informed manner with other students and teachers.
- Attempt to answer a self-generated, scientific, testable question in a hands on setting
- Master all key vocabulary terms associated with this unit of instruction
- Successfully identify all types of variables in many different examples of scientific experiments
- Successfully be able to integrate pertinent mathematics concepts into their data recording and analysis (graphing, charting, averaging)
- Successfully be able to identify the two different types of data that can be produced by a scientific experiment
- Increase the ability to think critically through problems both inside and outside of the Science classroom
- Make meaningful observations that are free from opinion
- Make inferences based on data and scientific information
- Formulate well thought out conclusions following scientific experiments
- Identify experimental flaws and provide solutions to those flaws
- Distinguish between Physics, Chemistry, Earth and Space Science and describe how they overlap.

Overview: Throughout this unit students will gain knowledge and experience for how to utilize scientific thinking and practice skills for experimenting. Review and reinforcement of measuring data, formulating and carrying out a design plan, and observing and analyzing data will allow students the needed practice for future laboratory preparedness. Through experiences with hands-on learning opportunities, students will attain an understanding of the importance of careful measurements, as well as design and execution of controlled experiments to demonstrate “good” science practices.

Goals:

- For students to build a solid body of knowledge about scientific thinking skills, experimental design and data analysis
- Discuss the scientific problem solving model in an informed manner with other students and teachers.
- Master all key vocabulary terms associated with this unit of instruction
- Successfully identify all types of variables in many different examples of scientific experiments
- Successfully be able to integrate pertinent mathematics concepts into their data recording and analysis (graphing, charting, averaging)
- Successfully be able to identify the two different types of data that can be produced by a scientific experiment
- Formulate well thought out conclusions following scientific experiments
- Identify experimental flaws and provide solutions to those flaws

Objectives:

- Identify the steps scientists often use to solve problems. (DOK level – 1)
- Describe why scientists use variables. (DOK level – 2)
- Name the prefixes used in SI and indicate what multiple of ten each one represents. (DOK level -1)
- Identify SI units and symbols for length, volume, mass, density, time, and temperature. (DOK level – 1)
- Convert related SI units. (DOK level – 3)
- Identify three types of graphs and explain the ways they are used. (DOK level –
- 1, DOK - 2)
- Distinguish between dependent and independent variables.(DOK level – 2)
- Analyze data using the various types of graphs. (DOK level – 4)

Core Activities and Corresponding Instructional Methods:

- Present all vocabulary for the unit in a manner that will foster understanding and retention.
- Provide students with experiment scenarios to identify the variables within the examples.
- Have students work on an in-class graded laboratory experiment where they will utilize all parts of the scientific method and will identify variables within the experiment.

- Given assorted experimental data, students will decide the best-fit method for displaying the data in graphs. Students should be able to explain why the chosen chart or graph is the best mode for this data as well and offer an explanation of the data by analyzing trends and results based on the given variables.

Assessments:

- **Diagnostic:**
  - Pre-assessments
  - Class Discussions
  - Oral Responses
  - Homework
  - Teacher Observations
- **Formative:**
  - Lesson Quizzes
  - Graded Homework Assignments
  - Laboratory Reports
  - Short Opened Ending Assignments
- **Summative:**
  - Unit Quizzes
  - Major Assessments
  - PSSA Aligned Short Open Ended Assessments

Extensions: Optional recommended Inquiry Labs and Digital Path interactive multimedia practice opportunities. Students can apply all methods for measuring and describing the motion of common objects to other objects. Students will select or construct accurate and appropriate representations for motion (visual, graphical, and mathematical); defend conclusions/ explanations about the motion of objects and real – life.

Correctives:

- Students can practice calculating energy, work and power through mathematical word problems.
- Calculating Unit Mathematical Applications
- Make use of vocabulary building study skills (flashcards, foldables, crossword puzzles) Give students extra practice on all concepts covered within this unit Reteach and retest concepts
- Unit Pretests/Posttests
- Lesson Quizzes

- Alternative Assessment
- Performance-Based Assessments
- Unit Review
- Unit Tests
- End-of-Module Tests

Materials and Resources:

- Primary Textbook : Science Fusion Module: Matter and Energy, Grades 6-8. Houghton Mifflin Harcourt , 2017
- Supplemental assignments and activities
- SAS Website
- Various websites and online resources

Curriculum Plan

Unit 5: Matter (Unit 1: Lesson 1 -3) **Marking Period: 2**

Science Fusion H: Matter and Energy

Standard(s): PA Academic Standards, PACCS English/Language Arts
3.2.8.A1, CC.3.5.6-8.B, CC.3.5.6-8.C, CC.3.5.6-8.D, CC.3.5.6-8.E, CC.3.5.6-8.F, CC.3.5.6-8.G, CC.3.5.6-8.H, CC.3.5.6-8.I, CC.3.5.6-8.J
http://www.pdesas.org/CMap/CFramework

Anchor(s): S.8.C.1.1.1, S.8.C.1.1.2
http://static.pdesas.org/content/documents/CF-Science_MS_PhysicalScience.pdf

Big Idea(s): Matter is described by its properties and may undergo changes.

Essential Questions:
- What properties define matter?
- What are physical and chemical properties of matter?
- What are physical and chemical changes of matter?

Concepts:
- Matter that which occupies space and possesses rest mass, especially as distinct from energy.
- Mass is the amount of matter in an object
- Volume is the amount of space something occupies.
- Density, mass of a unit volume of a material substance. The formula for density is d = M/V, where d is density, M is mass, and V is volume. Density is commonly expressed in units of grams per cubic centimeter.
- A physical property is a characteristic of a material that can be observed without changing the identity of the substances that make up the material.
- A chemical property is a characteristic of a substance that indicates whether it can undergo a chemical change.

Competencies:
Students will be able to:
- To relate mass, weight, volume and density to one another

- To classify and compare substances based on their physical and chemical properties.
- To distinguish between physical and chemical changes of matter
- Master all studied vocabulary in association with this unit.
- Identify physical properties of matter.
- Explain physical properties of matter.
- Identify chemical properties of matter.
- Explain chemical properties of matter.
- Apply the conservation of mass.

Overview: Throughout this unit students will be assessing substances that occur all around them. They will be observing objects on a molecular level to identify which category of a substance the object falls into. Students will also be observing the physical and chemical characteristics of a substance and categorizing the substance based on those characteristics.

Goals:

- Students will observe objects around them and explain the particles that make them up.
- Students will successfully identify and explain the physical characteristics of a substance.
- Students will successfully identify and explain the chemical characteristics of a substance.
- Students will successfully categorize an object's physical or chemical properties.
- Master all key vocabulary terms associated with this unit of instruction

Objectives:

- Students will identify physical properties of objects (freezing and melting, sinking and floating, color, size, texture, shape, weight) (DOK level - 2)
- Student will separate and sort objects by physical attributes (DOK level - 2)
- Students will be able to measure objects using standard and non-standard units (DOK level - 1)
- Students will observe and explain the physical and chemical properties of a substance. (DOK level -2)
- Students will analyze the physical and chemical properties of a substance and predict what type of change it will undergo. (DOK level – 4)

Core Activities and Corresponding Instructional Methods:

- Present all vocabulary for the unit in a manner that will foster understanding and retention.
- Present students with several examples of objects and have them explain the particles that make them up.
- Have students pick objects of their choice and allow them to describe the particles that make them up.

- Provide students with various objects and have them identify the physical and chemical properties of the objects.
- Provide scenarios of objects undergoing a change and have the students classify the changes as physical or chemical.
- Have students perform a laboratory assignment where they measure the amount of mass of substance before and after they undergo a chemical change

Assessments:

- **Diagnostic:**
  - Pre-assessments
  - Class Discussions
  - Oral Responses
  - Homework
  - Teacher Observations
- **Formative:**
  - Lesson Quizzes
  - Graded Homework Assignments
  - Laboratory Reports
  - Short Opened Ending Assignments
- **Summative:**
  - Unit Quizzes
  - Major Assessments
  - PSSA Aligned Short Open Ended Assessments

Extensions: Optional recommended Inquiry Labs and Digital Path interactive multimedia practice opportunities.

Correctives:

- Make use of vocabulary building study skills (flashcards, foldables, crossword puzzles) Give students extra practice on all concepts covered within this unit Reteach and retest concepts
- Unit Pretests/Posttests
- Lesson Quizzes
- Alternative Assessment
- Performance-Based Assessments
- Unit Review
- Unit Tests

- End-of-Module Tests

Materials and Resources:

- Primary Textbook : Science Fusion Module: Matter and Energy, Grades 6-8. Houghton Mifflin Harcourt , 2017
- Supplemental assignments and activities
- SAS Website
- Various websites and online resources

Curriculum Plan

Unit 6: Matter (Unit 1: Lesson 4 -6) **Marking Period: 3**
Science Fusion H: Matter and Energy

Standard(s): PA Academic Standards, PACCS English/Language Arts
3.2.8.A1, CC.3.5.6-8.B, CC.3.5.6-8.C, CC.3.5.6-8.D, CC.3.5.6-8.E, CC.3.5.6-8.F, CC.3.5.6-8.G, CC.3.5.6-8.H, CC.3.5.6-8.I, CC.3.5.6-8.J
http://www.pdesas.org/CMap/CFramework

Anchor(s): S.8.C.1.1.1, S.8.C.1.1.2
http://static.pdesas.org/content/documents/CF-Science_MS_PhysicalScience.pdf

Big Idea(s): There are three states in which matter exists in and they are governed by laws. Matter exists in many different forms, each of which has specific characteristics.

Essential Questions:
- How do pure substances and mixtures compare?
- How do particles in solids, liquids and gases moves?
- What happens when matter changes state?

Concepts:
- To distinguish between pure substances and mixtures
- To model the motion of particles in solids, liquids, and gases
- To describe changes of state in terms of attraction and motion of particles

Competencies:
Students will be able to:
- Identify a material as a pure substance, element, mixture, molecule or compound.
- Distinguish between pure substances, elements, mixtures, molecules and compounds.
- Identify what type of mixture a substance might be.

Overview: Throughout this unit students will be assessing substances that occur all around them. They will be observing objects on a molecular level to identify which category of a substance the object falls

into. Students will also be observing the physical and chemical characteristics of a substance and categorizing the substance based on those characteristics

Goals:

- Students will develop a greater appreciation of science in relation to the classification of matter.
- Students will observe objects around them and explain the particles that make them up.
- Students will successfully classify a substance as a pure substance, element, compound, molecule or mixture.
- Students will successfully categorize what type of mixture a substance is.
- Master all key vocabulary terms associated with this unit of instruction

Objectives:

- Differentiate what type of mixture they have based on its properties. (DOK level – 3)
- Classify a substance as a pure substance, element, compound, molecule or mixture. (DOK level – 2)
- Identify solids and liquids and recognize that liquids take the shape of their container. (DOK level – 2)

Core Activities and Corresponding Instructional Methods:

- Present all vocabulary for the unit in a manner that will foster understanding and retention.
- Provide students with objects and have them classify what type of substance they are based on their properties.
- Provide students with various mixtures and have them classify what type of mixtures they are.

Assessments:

- **Diagnostic:**
  - Pre-assessments
  - Class Discussions
  - Oral Responses
  - Homework
  - Teacher Observations
- **Formative:**
  - Lesson Quizzes
  - Graded Homework Assignments

        - Laboratory Reports
        - Short Opened Ending Assignments
        -
    - **Summative:**
        - Unit Quizzes
        - Major Assessments
        - PSSA Aligned Short Open Ended Assessments

Extensions: Optional recommended Inquiry Labs and Digital Path interactive multimedia practice opportunities. Students may choose to complete the States of Matter Lab simulation exploring the phases of matter at a molecular level and how molecules change phases. https://phet.colorado.edu/en/simulation/legacy/states-of-matter

Correctives:

- Make use of vocabulary building study skills (flashcards, foldables, crossword puzzles) Give students extra practice on all concepts covered within this unit Reteach and retest concepts
- Unit Pretests/Posttests
- Lesson Quizzes
- Alternative Assessment
- Performance-Based Assessments
- Unit Review
- Unit Tests
- End-of-Module Tests

Materials and Resources:

- Primary Textbook : Science Fusion Module: Matter and Energy, Grades 6-8. Houghton Mifflin Harcourt , 2017
- Supplemental assignments and activities
- SAS Website
- Various websites and online resources

Curriculum Plan

Unit 7: Energy **Marking Period: 3**

Science Fusion H: Matter and Energy

Standard(s): PA Academic Standards, PACCS English/Language Arts
3.2.8.A1, CC.3.5.6-8.B, CC.3.5.6-8.C, CC.3.5.6-8.D, CC.3.5.6-8.E, CC.3.5.6-8.F, CC.3.5.6-8.G, CC.3.5.6-8.H, CC.3.5.6-8.I, CC.3.5.6-8.J
http://www.pdesas.org/CMap/CFramework

Anchor(s): S8.A.3.2, S8.C.2.1.2, S8.A.2.1, S8.A.2.2, S8.C.2.1.3
http://static.pdesas.org/content/documents/CF-Science_MS_PhysicalScience.pdf

Big Idea(s): Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.

Essential Questions:

- What is energy?
- How is temperature related to kinetic energy?
- What is the relationship between heat and temperature?
- How does the use of energy resources affect the environment?

Concepts:

- Kinetic versus potential energy
- Forms of energy
- Law of conservation of energy
- Kinetic theory of matter
- Temperature and measuring temperature
- Thermal energy and heat
- Changes of state
- Methods of thermal energy transfer
- Renewable versus nonrenewable resources (including fossil fuels and alternative energy sources)

Competencies:
Students will be able to:

- Students will be able to describe how energy is conserved by changing forms
- Students will be able to relate temperature of a substance to the kinetic energy of its particles
- Students will be able to analyze the relationship between heat, temperature, and thermal energy
- Students will be able to recognize how the production and use of the different types of energy resources have environmental consequences

Overview: Throughout this unit students will be assessing changes in energy that occur all around them by exploring the conservation of energy. This idea will then be applied to energy sources that we use to power our world.

Goals:

- For students to relate and describe the transfer of energy to happenings they see around them on a regular basis.
- For students to recognize and explain the relationship between heat, temperature, and thermal energy
- For students to understand how the need to use energy drives the different resources that are utilized, all of which have different environmental impacts.

Objectives:

- Give examples of the major forms of energy and explain how each is produced (DOK: Level 1)
- Describe conversions of energy from one form to another (DOK: Level 1)
- State and apply the law of conservation of energy (DOK: Level 1 & 4)
- Analyze how energy is conserved in conversions between kinetic energy and potential energy (DOK: Level 4)
- Describe the relationship between energy and mass and calculate how much energy is equivalent to a given mass (DOK: Level 1 & 2)
- Describe the relationship between work and heat transfer (DOK: 2)
- Give examples of the means of heat transfer (DOK: 1)
- Identify the different types of renewable and nonrenewable energy sources (DOK: Level 1)
- Compare and contrast the environmental impacts that the different types of energy sources have on the environment (DOK: Level 2)

Core Activities and Corresponding Instructional Methods:

- Present all vocabulary for the unit in a manner that will foster understanding and retention.
- Have students draw representations of the particle arrangements of solids, liquids, and gases to demonstrate how kinetic energy impacts each.
- Provide students with various objects and have them identify which ones have greater thermal energy assuming the objects have the same temperature.
- Have students provide examples of different methods of heat transfer (conduction, convection, and radiation) based on things in their everyday lives.
- Have students research and describe various renewable and nonrenewable resources and create a poster that displays the pros and cons of each.

Assessments:

- **Diagnostic:**
  - Pre-assessments
  - Class Discussions
  - Oral Responses
  - Homework
  - Teacher Observations
- **Formative:**
  - Lesson Quizzes
  - Graded Homework Assignments
  - Laboratory Reports
  - Short Opened Ending Assignments
- **Summative:**
  - Unit Quizzes
  - Major Assessments
  - PSSA Aligned Short Open Ended Assessments

Extensions: Optional recommended Inquiry Labs and Digital Path interactive multimedia practice opportunities. Students will be able to examine how an object's potential and kinetic energy change as it moves and how an object's total energy remains constant. Students will be able to determine the variables that affect an object's potential and kinetic energy. Students will be able to Propose modifications to the Energy Skate Park Basics PhET simulation. https://phet.colorado.edu/en/contributions/view/3567

Correctives:

- Make use of vocabulary building study skills (flashcards, foldables, crossword puzzles) Give students extra practice on all concepts covered within this unit Reteach and retest concepts
- Unit Pretests/Posttests
- Lesson Quizzes
- Alternative Assessment
- Performance-Based Assessments
- Unit Review
- Unit Tests
- End-of-Module Tests

Materials and Resources:

- Primary Textbook : Science Fusion Module: Matter and Energy, Grades 6-8. Houghton Mifflin Harcourt , 2017
- Supplemental assignments and activities
- SAS Website
- Various websites and online resources

Curriculum Plan

Unit 8: Atoms and the Periodic Table **Marking Period: 4**

Science Fusion H: Matter and Energy

Standard(s): PA Academic Standards, PACCS English/Language Arts
3.2.8.A1, CC.3.5.6-8.B, CC.3.5.6-8.C, CC.3.5.6-8.D, CC.3.5.6-8.E, CC.3.5.6-8.F, CC.3.5.6-8.G, CC.3.5.6-8.H, CC.3.5.6-8.I, CC.3.5.6-8.J
http://www.pdesas.org/CMap/CFramework

Anchor(s): S8.C.1.1.1, S8.A.3.2, S8.C.1.1.1, S8.A.3.3, S11.C.1.1.4
http://static.pdesas.org/content/documents/CF-Science_MS_PhysicalScience.pdf

Big Idea(s): The atomic structure of an atom determines the properties of the element and determines how the element interacts with other elements.

Essential Questions:
- How do we know what parts make up the atom?
- How are the elements arranged on the periodic table?
- How do atoms interact with each other?
- How can atoms join together?

Concepts:
- Atomic theory
- Subatomic particles
- Atomic number and mass number
- Arrangement of elements on the periodic table
- Chemical bonds
- Atomic models
- Valence electrons
- Ionic bonds
- Covalent bonds
- Metallic bonds

Competencies:
Students will be able to:
- Students will be able to describe the major milestones in the development of atomic theory.
- Students will be able to identify the locations and charges of the three subatomic particles.
- Students will be able to determine an element's atomic number and calculate mass number.
- Students will be able to describe how elements are arranged on the periodic table based on set trends.
- Students will be able to explain why atoms form chemical bonds.

- Students will compare and contrast the types of bonds that form between atoms.

Overview: Throughout this unit, students will learn about the basics of atomic theory, which can then be applied to the organization of the periodic table. Students will explore why the periodic table is arranged in the manner it is. Using the concepts of atomic structure and valence electrons, students will then be able to predict and describe the types of bonds that form between atoms.

Goals:

- For students to understand the discoveries that led to the development of modern atomic theory.
- For students to be able to identify the location and charges of the subatomic particles.
- For students to identify atomic number and calculate the mass number of a given element.
- For students to understand the reasoning behind the arrangement of the modern periodic table of element.
- For students to predict and describe the chemical bonds that form between atoms and their properties.
- For students to compare and contrast the properties of ionic, covalent, and metallic bonds.

Objectives:

- Identify the particles that make up an atom (DOK level 1)
- Identify the charges of those particles (DOK level 1)
- Cite the location of the subatomic particles in an atom (DOK level 3)
- Describe the four major scientists' contributions to atomic theory (DOK level 2)
- Compare and contrast those theories (DOK level 2)
- Calculate mass number (DOK Level 2)
- Be able to apply that knowledge and have a working knowledge of the periodic table for the remainder of the year during laboratory explorations and subsequent units of Chemistry instruction (DOK level 4)
- Predict an element's chemical properties using the number of valence electrons and electron dot diagrams (DOK: Level 2)
- Describe and compare how covalent, ionic, and metallic bonds form and the attractions that keep atoms together in molecules (DOK: Levels 2)

Core Activities and Corresponding Instructional Methods:

- Present all vocabulary for the unit in a manner that will foster understanding and retention.

- Have students draw representations of the subatomic particle in a generalized model of an atom.
- Have students determine atomic number and calculate mass number given different elements.
- Provide students with opportunities to locate elements on the periodic table and determine its properties after color coding their own copy of the table
- Students can draw Lewis dot diagrams to predict likelihood of a particular chemical bond developing
- Students can create analogies of real life situations that represent the different types of chemical bonds that are being studied

Assessments:

- **Diagnostic:**
  - Pre-assessments
  - Class Discussions
  - Oral Responses
  - Homework
  - Teacher Observations
- **Formative:**
  - Lesson Quizzes
  - Graded Homework Assignments
  - Laboratory Reports
  - Short Opened Ending Assignments
- **Summative:**
  - Unit Quizzes
  - Major Assessments
  - PSSA Aligned Short Open Ended Assessments

Extensions: Optional recommended Inquiry Labs and Digital Path interactive multimedia practice opportunities. Students can create license plates or wanted posters of a given element to explore their unique properties in greater detail. (See Appendix E)

Correctives:

- Make use of vocabulary building study skills (flashcards, foldables, crossword puzzles)
- Give students extra practice on all concepts covered within this unit
- Reteach and retest concepts
- Unit Pretests/Posttests
- Lesson Quizzes

- Alternative Assessment
- Performance-Based Assessments
- Unit Review
- Unit Tests
- End-of-Module Tests

Materials and Resources:

- Primary Textbook : Science Fusion Module: Matter and Energy, Grades 6-8. Houghton Mifflin Harcourt , 2017
- Supplemental assignments and activities
- SAS Website
- Various websites and online resources

Primary Textbook(s) Used for this Course of Instruction

Name of Textbook: Science Fusion: Motion, Forces, and Energy
Science Fusion: Matter & Energy

Textbook ISBN #: 978-0-544-778767-2

Textbook Publisher & Year of Publication: Houghton Mifflin Harcourt, 2017

Curriculum Textbook is utilized in (title of course): Science 8

DELAWARE VALLEY SCHOOL DISTRICT

Appendix A

8th Grade Science Curriculum

Standard Vocabulary Terms

Marking Period 1:

Unit 1: Motion and Forces

motion

speed

position

reference point

vector

velocity

acceleration

centripetal acceleration

force

net force

inertia

gravity

free fall

orbit

Unit 2: Work, Energy and Machines

work

energy

power

kinetic energy

potential energy

mechanical energy

machine

mechanical advantage

mechanical efficiency

lever

fulcrum

wheel and axle

pulley

inclined plane

Marking Period 2:

Unit 3: Magnets, Magnetism and Electromagnetism

magnet

magnetic force

magnetic pole

magnetic field

electromagnetism

solenoid

electromagnet

electric motor

transformer

electric generator

electromagnetic induction

Unit 4: Nature of Science

Scientific Method

Hypothesis

Experiment

Variables

Dependent Variable

Independent Variable

Constant/Controlled Variables

Control

Bias

Model

Theory

Scientific Law

Technology

Precision

Accuracy

Unit 5: Matter - (Lessons 1- 3)

Matter

Mass

Weight

Volume

Density

Physical Change

Chemical Change

Law of Conservation of Mass

Marking Period 3:

Unit 6: Matter - (Lessons 4 - 6)

Atom

Element

Compound

Mixture

Pure Substances

Heterogeneous

Homogeneous

Solid

Liquid

Gas

Freezing

Melting

Evaporation

Boiling

Condensation

Sublimation

Deposition

Unit 7: Energy

Energy

Kinetic Energy

Potential Energy

Mechanical Energy

Energy Transformations

Law of Conservation of Energy

Kinetic Theory of Matter

Temperature

Degree

Thermometer

Thermal Energy

Conductor

Convection

Heat

Insulator

Radiation

Conduction

Calorie

Renewable Energy

Nonrenewable resources

fossil fuel

Unit 8: Atoms and the Periodic Table

Atom

Electron

Nucleus

Proton

Neutron

Electron Cloud

Atomic Number

Mass Number

Periodic Table

Chemical Symbol

Average Atomic Mass

Metal

Nonmetal

Metalloid

Group

Period

Chemical Bond

Valence Electron

Ion

Ionic Bond

Covalent Bond

Molecule

Metallic Bond

Appendix B:
Materials and Resources

- Primary Textbook:
  - ➢ Science Fusion: Motion, Forces, and Energy & Science Fusion: Matter & Energy
- Supplemental assignments and activities from teacher's edition and lab workbook
- SAS Website
- Various websites and online resources, including but not limited to YouTube videos/clips, PhET simulations, assorted diagrams and illustrations
- Movies and videos to reinforce content including but not limited to October Sky, Wall-E, Echo, Fern Gully, The Day After Tomorrow, Apollo 13 (clips), The Martian, Tron, Big Hero 6, The Lorax, assorted Mythbusters/NOVA/Bill Nye clips and episodes

Appendix C

Newton's Laws of Motion Book

Challenge: To create a book that illustrates Newton's Laws of Motion. You will need to demonstrate your understanding of Newton's three laws through illustrations and text. The quality of the illustrations/images and overall quality of the presentation will be evaluated as part of your grade. The following rubric will be used to evaluate your project and should help guide you in its development.

Criteria:

_____ Book Cover Page- Book title (ex. Newton's Laws of Motion), picture dealing with Newton's Laws of Motion, author name, illustrator name

_____ Table of Contents- create a table of contents for the pages that follow (ex. pg. 1 Newton's 1st Law of Motion)

_____ Newton's Laws of Motion Pages- create a page or pages for each of Newton's Laws. You must include the following for each law page:

- Law's name
- State the law below its name
- Create/Draw/Compose/Find a picture(s) that describes the law
- Simple explanation of the physics involved (ex. may use sample problem with formula $F=m \cdot a$)
- Come up with a demonstration or experiment that I could use in the classroom to teach each law (use of everyday objects or situations)

_____ Evidence of research on the topics of Newton's three laws.
(Include a Works Cited at end of book: easybib.com/noodletools.com)

_____ Able to relate real-life situations to the three laws.

_____ Sub-Total

_____ Bonus Page- Friction : create a page(s) on friction. You must include the following for this page:

- Definition for friction (in your own words)
- Picture describing friction
- Demonstration or experiment for friction (or real-life situation)

_____ Total Book

Appendix D

PhET Simulation: Magnets and Electromagnets

Essential Questions:

What affects the strength of Electric and Magnetic Forces? (MS-PS2-3)

Initial thoughts:

What evidence is there that fields exist between objects even if those objects are not in contact? (MS-PS2-5)

Initial thoughts:

Click on the tab titled: Bar Magnet. Spend a minute or 2 exploring the simulation.
Qualitative observations. (Qualitative means: _____)

Where is the magnetic field strongest?	
What evidence shows you this?	
As you change the strength of the magnet how does the readout change?	

Quantitative observations. (Quantitative means: _____)
Change strength of magnet to 50% then click the box titled "Show Field Meter". Place the field meter (crosshairs) at the edge of the north end of the magnet.

What is the reading of the Field Meter?						
As you move the meter away from the magnet what happens? Record 3 data points.	Distance	Meter Reading	Distance	Meter Reading	Distance	Meter Reading
Place the Field Meter about 4 cm from the magnet. Adjust the strength of the magnet.	Magnet Strength	Meter Reading	Magnet Strength	Meter Reading	Magnet Strength	Meter Reading

Record 3 data points.						

Click on the "Electromagnet" Tab. Spend a minute or 2 exploring the simulation.
Place the Field Meter near the electromagnet (*do not move it*). Record your data below:

Wraps	Volts	Magnetic Field (B)
1	10	
2	10	
3	10	
4	10	

Wraps	Volts	Magnetic Field (B)
4	2	
4	4	

4	6	
4	8	
4	10	

Essential Questions:

What affects the strength of Electric and Magnetic Forces? (MS-PS2-3)

Final thoughts and evidence:

What evidence is there that fields exist between objects even if those objects are not in contact? (MS-PS2-5)

Final thoughts and evidence:

Appendix E

Element Wanted Poster

Name: _____ Pd: _____ Element: _____

Your element is wanted by the police. Use the following guidelines to create a wanted poster to identify it for capture. Your poster should be done in google docs or on an 8.5 x 11 or 11 x 17 piece of paper, clearly and legibly written (Type if you know your writing is not legible. You know who you are!) *You will be assigned an element from the periodic table.*

This element project is to be completed ***INDIVIDUALLY***. It will be due next week on **Friday, May 18th FINAL DEADLINE! NO EXCEPTIONS!!!!**

Your poster should include the following parts:

1. **HEADING** – Wanted! Name of element and symbol for element.
2. **DESCRIPTION** – This is valuable information! Include:
    a. Picture (at least 2… search Google images)
    b. Bohr's Diagram of Element (electron configuration)
    c. I.D. number (Atomic number… ex. Hydrogen has an atomic number of 1)
    d. Physical properties – Describe at least 5 physical properties of the element (examples: color, odor, taste, clarity, texture, state, luster, density, malleability, ductility, hardness, viscosity, melting point, boiling point, solubility, etc.)
    e. Alias - Other names used for your element. Include historical names, common names, slang

terms, etc. (List 2)

2. **LAST KNOWN WHEREABOUTS**
   a. Hangouts (Location where your element is found in nature and on the periodic table; period and group)
   b. Buddies (Name something your element reacts with and the compound that it forms).

3. **METHOD OF OPERATION** - describe at least 3 uses of the element.

4. **REPORT ON FIRST ARREST**
   a. First Arresting Officer: Who discovered the element?
   b. Date arrested: When was it discovered?
   c. Particulars: How and where was it discovered?

(Note: some elements have been around so long that it is unknown when they were discovered)

5. **WARNINGS** – Are there any precautions that should be taken when handling this element? Is it reactive, poisonous, flammable, corrosive, explosive, and/or dangerous to your health (list 1) and to the environment (list 1)?

6. **Don't forget to list your references (websites used)**! You should have at least three sources.

7. **Element Photo Booth prop-** Create your own Photo Booth prop that relates to your element.

Project Layout:

- Must be done on the back of Element Poster Worksheet
- Portrait layout ☐
- Information on the bottom half
- Pictures should take up ¼ of your paper
-

DO NOT COPY AND PASTE FROM THE INTERNET OR FROM A FRIEND. THIS IS PLAGIARISM.

If you finish the Wanted Poster and have time to spare, complete the following online games:

1. Go to Google and type in "element picture quiz". Click on the first link. Complete the multiple choice quiz to see how many different elements you can recognize! Don't worry if you don't know them all.
2. Go to Google and type in "element symbol matching quiz". Click on the first link. Match the symbol to the word and then click on "Check your score".
3. Go to the following website: http://www.funbrain.com/periodic/index.html. Click on "Name the Element (Hard)", and then click on "Most Common Elements (Easy)". Click on "Play Proton Don". In the text box at the top of the periodic table, type in the correct name for the highlighted element.

DELAWARE VALLEY SCHOOL DISTRICT

Name: _____ Pd: _____ **Element Poster – Worksheet**

Fill out the worksheet below as you do your research. All information should be included on the poster.

Element name: _____

Electron Configuration: ___,____,____,____

Atomic number: _____ **Mass number:** _____ **Bohr Model :**

Physical Properties: (5 of the following - color, odor, taste, clarity, texture, state, luster, density, malleability, ductility, hardness, viscosity, melting point, boiling point, solubility, etc.) (5 pts)

_____
_____
_____
_____
_____

Alias (other names; 2 pts) _____

Method of Operation (3 uses; 3 pts) _____

_____
_____
_____

Hangouts (where it is found in nature and on the periodic table; 2 pts)

_____
_____
_____

Buddies (other elements that your element reacts with, and the compounds that form; 2 pts)____

_____

First arresting officer: (Who discovered the element? 2 pt) _____

Date arrested: (When was it discovered? 2pt)_____

Particulars: (How and where was it discovered? 2 pt)_____

_____
_____

Warnings (list any dangers to health and environment; 10 pts):

_____

_____

_____

References (You must have 3; 3pts)

_____

_____

_____

_____

Name: _____ Pd: _____ Element: _____

Element Most Wanted Poster Rubric

DELAWARE VALLEY SCHOOL DISTRICT

Category	Scoring Criteria	Points Available	Self-Evaluation	Points Earned
1. **Heading**	Element Name	2		
	Chemical Symbol	2		
2. **Description**	Two Pictures (1 may be Element tile)	10		
	Atomic Number	2		
	Atomic Mass	2		
	Alias (AKA)	2		
	5 Physical Properties	10		
3. **Method of Operation**	Wanted For- 3 Uses-give details	9		
4. **Last Known Whereabouts**	Hangouts	2		
	Known Associates / Buddies	2		
5. **Report on First Arrest**	Arresting Officers	2		
	Date arrested	2		
	Particulars	2		
6. **Warnings**	3-5 Chemical Properties	9		
7. **References**	3 References (Easybib.com)	10		
8. **Organization**	Neat and easy to read	5		
9. **Creativity**	Colorful, unusual, eye catching,	10		
10. **Grammar**	Correct spelling and punctuation	4		
11. **Factually Correct Information**	All information is accurate and correct	5		
12. **Element Photo Booth Prop**	Relate to element, product primarily made from, discover, etc.	5		
13. **Your Name and Class Period**	Written on front or back	2		
Total Points		**100**		