Board Approved
October 2015

Wilson Area School District
Planned Course Guide

Title of planned course: Physical Science

Subject Area: Science

Grade Level: 6

Course Description: This course is designed to serve as an introductory course for the students in the fields of Scientific Process Skills, Energy, Motion and Forces, and Properties of Matter. Students will be expected to focus on research and experimentation to gain a greater understanding of the physical world in which they live. The scientific process skills learned in the first unit, will be carried into and practiced in all units.

Time/Credit for this Course: One full school year

Curriculum Writing Committee: Diana Partridge

Board Approved
October 2015

Curriculum Map

August: Process Skills

September: Process Skills

October: Process Skills

November: Process Skills/ Energy

December: Energy/Motion and Forces

January: Motion and Forces

February: Motion and Forces

March: Properties of Matter

April: Properties of Matter

May: Properties of Matter

June: Properties of Matter

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Wilson Area School District
Planned Course Materials

Course Title: **6th Grade Physical Science**

Textbook:

Physical Science 2.0
The McGraw-Hill Companies © 2012
www.connected.mcgraw-hill.com

Foss Science Stories: Variables
Delta Education
http://www.fossweb.com/modules3-6

Foss Science Stories: Mixtures and Solutions
Delta Education
http://www.fossweb.com/modules3-6

Foss Science Stories: Levers and Pulleys
Delta Education
http://www.fossweb.com/modules3-6

Supplemental Books:

Physical Science 2.0
Online Resources and Interactive Student Textbook
The McGraw-Hill Companies © 2012
www.connected.mcgraw-hill.com

Variables: Science Notebook
Delta Education
http://www.fossweb.com/modules3-6

Mixtures and Solutions: Science Notebook
Delta Education
http://www.fossweb.com/modules3-6

Levers and Pulleys: Science Notebook
Delta Education
http://www.fossweb.com/modules3-6

Teacher Resources:

Foss Module: Variables
Delta Education
http://www.fossweb.com/modules3-6

Foss Module: Mixtures and Solutions
Delta Education
http://www.fossweb.com/modules3-6

Foss Module: Levers and Pulleys
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Discovery Education
United Streaming
http://www.discoveryeducation.com

Buckle Down Grade 8
Buckle Down Publishing
2007
http://www.buckledown.com

PA Dept. of Education Standards Aligned System
http://www.pdesas.org

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Curriculum Scope & Sequence

Planned Course: 6th Grade Physical Science

Unit: Process Skills

Time frame: 9 weeks

State Standard(s): S8.A.1, 2, 3

Anchor(s) or adopted anchor: S8.A.1.1, 3; S8.A.2.1, 2; S8.A.3.1

Essential content/objectives: At end of the unit, students will be able to:

- Distinguish between a scientific theory and an opinion
- Explain how certain questions can be answered through scientific inquiry and/or technological design
- Use evidence, such as observations or experimental results, to support inferences about a relationship
- Develop descriptions, explanations, predictions, and models using evidence. Use ratio to describe change (e.g., mechanical advantage)
- Use evidence, observations, or explanations to make inferences about change in systems over time and the variables affecting these changes
- Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change
- Use evidence, observations, or a variety of scales (e.g., mass, distance, volume, temperature) to describe relationships
- Formulate hypotheses
- 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
- Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions
- Use evidence from investigations to clearly communicate and support conclusions
- Describe and apply the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions
- Describe a system as a group of related parts with specific roles that work together to achieve an observed result
- Calculate density and describe what factors affect the density of a fluid
- Explain how pressure and buoyant force are related

Core Activities: Students will complete/participate in the following during the course of two FOSS investigations (*Swingers* and *Lifeboats*), Scientific Problem Solving lessons 1, 2, and 3, and Chapter 4 in the textbook.

- Follow the scientific method including how to correctly write a hypothesis, procedure, and conclusion with various mini experiments
- Use lab equipment correctly (scales, thermometers, graduated cylinders, rulers, etc.) and measure with appropriate metric units with metric practice, stations, and Metric Olympics
- FOSS *Swingers* Investigation (*Exploring Swingers, Testing Variables, and Predicting Swings)*
- FOSS *Lifeboats* Investigation (*Exploring Boats, Lifeboat Inspections, and Inspecting other Boats)*
- FOSS Science Stories (*What Scientists Do; Swinging Through History; Sink or Swim?; Science in the Bathtub*)
- Launch Labs (*What changes? What doesn't? and How can object denser than water float on water?)*
- Virtual Lab (*Why do Things Float?)*
- Identify independent, dependent, and constant variables in the contexts of experiments
- Use statistical representations for data (median, mode, range, outliers, box and whiskers plots, graphs, etc.)

Extensions:

- Language Extensions
  - Research pendulum history
  - Research boats and ships
  - Research aviation news
  - Prepare oral presentations
- Math Extensions
  - Problem of the week
  - Play an ordered-pairs game—Hurkle
  - Measure displacement volume
  - Determine speed
- Science Extensions
  - Investigate variables with toys
  - Launch balloon rockets
  - Test consumer products.

Remediation:

- Teacher led small groups
- Examples of experiments to follow as an exemplar
- Repetition of science experiments/investigations
- Cooperative learning groups
- Differentiated Student Projects
- Focused study guides

Instructional Methods:

- Hands-on exploration within cooperative learning groups
- Small and large-group instruction
- Direct instruction, including note-taking from textbook
- Modeling
- Independent practice

Materials & Resources:

Physical Science 2.0
Textbook, Online Resources, and Interactive Student Textbook
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FOSS: Variables
Science Stories
Science Notebook
Module
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Assessments:

- Diagnostic:
  - Questioning
  - Large group discussion
  - Student observation
  - Review of student work
  - Warm-up questions /Exit tickets
- Formative:
  - Student observation
  - Quizzes
  - Response sheets
  - Lab sheets
  - Warm-up questions /Exit tickets
  - Review of student work
- Summative:
  - End-of-module assessment/test
  - Portfolio
  - Student projects

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Curriculum Scope & Sequence

Planned Course: 6th Grade Physical Science

Unit: Energy

Time frame: 5 weeks

State Standard(s): S8.A.1, 2, 3; S8.C.2, 3

Anchor(s) or adopted anchor: S8.C.2.1; S8.C.3.1

Essential content/objectives: At end of the unit, students will be able to:

- Distinguish among forms of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (i.e., renewable and nonrenewable energy)
- Explain how energy is transferred from one place to another through convection, conduction, or radiation
- Describe how one form of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy
- Describe forces acting on objects (e.g., friction, gravity, balanced versus unbalanced)
- Distinguish between kinetic and potential energy
- Describe how energy is related to work
- Apply the law of conservation of energy

Core Activities: Students will complete/participate in the following during the course of two FOSS investigations (*Plane Sense* and *Flippers*) and Chapter 5 in the textbook

- FOSS *Plane Sense* Investigation (*Exploring Flight, Investigating Variables, Flights of Fancy and Graphing the Results*)
- FOSS *Flippers* Investigation (*Flip-Stick Construction, Flip Out, Controlled Experiments, Choosing Your Own Investigation*)
- FOSS Science Stories (*Airplane Basics; Experimental Designs; Great Names in Aviation history; Build Your Own Paper Airplane; Flingers, Prove it!)*
- Launch Labs (*Can you make a change in matter?; Is energy lost when it changes forms?; How are energy resources different?)*
- Pinwheel Power lab
- Webquests –(*Home of the Future; Hybrid Vehicles; Alternative Fuels*)
- Brain POP: Movie: *Forms of Energy*
- Identify independent, dependent, and constant variables in the contexts of experiments
- Use statistical representations for data (median, mode, range, outliers, box and whiskers plots, graphs, etc.)

Extensions:

- Language Extensions
  - Research aviation news
  - Research catapults
  - Prepare oral presentations
- Math Extensions
  - Problem of the week
  - Investigate trajectory
- Science Extensions
  - Investigate forces of flight

Remediation:

- Teacher led small groups
- Examples of experiments to follow as an exemplar
- Repetition of science experiments/investigations
- Cooperative learning groups
- Integration of Science Stories
- Differentiated Student Projects
- Focused study guides

Instructional Methods:

- Hands-on exploration within cooperative learning groups
- Small and large-group instruction
- Direct instruction, including note-taking from textbook
- Modeling
- Independent practice

Materials & Resources:

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Assessments:

- Diagnostic:
  - Questioning
  - Large group discussion
  - Student observation
  - Review of student work
  - Warm-up questions /Exit tickets
- Formative:
  - Student observation
  - Quizzes
  - Response sheets
  - Lab sheets
  - Warm-up questions /Exit tickets
  - Review of student work
- Summative:
  - End-of-module assessment/test
  - Portfolio
  - Student projects

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Curriculum Scope & Sequence

Planned Course: 6th Grade Physical Science

Unit: Motion and Forces

Time frame: 9 weeks

State Standard(s): S8.A.1, 2, 3; S8.C.3

Anchor(s) or adopted anchor: S8.A.3.1; S8.C.3.1

Essential content/objectives: At end of the unit, students will be able to:

- 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)
- Describe forces acting on objects (e.g., friction, gravity, balanced versus unbalanced)
- Explain the concepts of lever arm, fulcrum, load and effort
- Identify and diagram class-1, class-2, and class-3 levers
- Assemble and diagram one-and two-pulley system.
- Explain and calculate the relationship between the numbers of ropes pulling on a load and the effort required to lift that load
- Describe the position of an object in two dimensions
- Use a distance-time graph to calculate average speed
- Explain ways velocity and acceleration can change

Core Activities:

Students will complete/participate in the following during the course of four FOSS investigations (*Levers, More Leverage, Pulleys, and Pulleys at Work*) and Chapters 1 and 3 in the textbook.

- FOSS *Levers* Investigation (*Introduction to Levers, Lever Experiment A, Lever Experiment B)*
- FOSS More *Leverage* Investigation (*Lever Classes, Lever Diagrams, Real-World Levers, Lever Pictures*)
- FOSS *Pulleys* Investigation (*One-Pulley Systems, Two-Pulley Systems, Pulley Game)*
- FOSS *Pulleys at Work* Investigation (*Effort in Pulley Systems, Measuring Distance, Choosing Your Own Investigation*)
- FOSS Science Stories (*Simple Machines; Class-1 Levers; the Wheel and Axle; Class-2 Levers; Class-3 Levers; The Inclined Plane; Pulleys; Dear Boss; The Wedge; The Work of Pulleys; The Screw; Thank You, Mr. Clumpet)*
- Launch Labs (*How do you know when work is done?; How do machines work?; How do you get there from here?; How can motion change?; In what ways can velocity change?)*
- *Comparing Two Simple Machines* lab

- *Calculate Average Speed from a Graph* lab
- Webquest –(*Roller Coaster Physics*)
- Brain POP: *Pulleys; Acceleration*
- Identify independent, dependent, and constant variables in the contexts of experiments.
- Use statistical representations for data (median, mode, range, outliers, box and whiskers plots, graphs, etc.)

Extensions:

- Language Extensions
  - List everyday levers
  - Write about make believe levers
  - Research block and tackle
  - Research complex machines
- Math Extensions
  - Problem of the week
  - Explore number patterns
- Science Extensions
  - Build a teeter-totter
  - Build a compound lever
  - Find pulleys in use at home and school
  - Set up complex systems

Remediation:

- Teacher led small groups
- Examples of experiments to follow as an exemplar
- Repetition of science experiments/investigations
- Cooperative learning groups
- Differentiated Student Projects
- Focused study guides

Instructional Methods:

- Hands-on exploration within cooperative learning groups
- Small and large-group instruction
- Direct instruction, including note-taking from textbook
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- Independent practice

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Assessments:

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  - Large group discussion
  - Student observation
  - Review of student work
  - Warm-up questions /Exit tickets
- Formative:
  - Student observation
  - Quizzes
  - Response sheets
  - Lab sheets
  - Warm-up questions /Exit tickets
  - Review of student work
- Summative:
  - End-of-module assessment/test
  - Portfolio
  - Student projects

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Curriculum Scope & Sequence

Planned Course: 6th Grade Physical Science

Unit: Properties of Matter

Time frame: 13 weeks

State Standard(s): S8.A.1, 2, 3; S8.C.1

Anchor(s) or adopted anchor: S8.C.1.1

Essential content/objectives: At end of the unit, students will be able to:

- Explain the differences among elements, compounds, and mixtures
- Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test)
- Identify and describe reactants and products of simple chemical reactions
- Compare the solubility of materials
- Determine relative concentrations of solutions
- Explain how changes in energy affect the state of matter and the law of conservation of mass
- Describe the difference between thermal energy and temperature
- Explain and apply the principles of Boyle's and Charles's laws.
- Explain how the atomic model changed over time
- Differentiate between protons, electrons, and neutrons
- Use the periodic table to describe the properties of elements including metals, nonmetals, and metalloids
- Distinguish between types of bonds
- Describe and identify different types of chemical reactions and their changes in energy
- Differentiate between solutions, compounds, and mixtures
- Measure and discuss the pH of substances

Core Activities: Students will complete/participate in the following during the course of four FOSS investigations (*Separating Mixtures, Reaching Saturation, Concentration, and Fizz Quiz*) and Chapters 7, 8, 9, 10, 11, 12, and 13 in the textbook

- FOSS *Separating Mixtures* Investigation (*Making and Separating Mixtures, Separating a Salt Solution, Observing Crystals, Separating a Dry Mixture*)
- FOSS *Reaching Saturation* Investigation (*Salt Saturation, Citric-Acid Saturation, The Saturation Puzzle, Comparing the Crystals*)
- FOSS *Concentration* Investigation (*Soft-Drink Recipes, Salt Concentration, Mystery Solutions)*
- FOSS *Fizz Quiz* Investigation (*Chemical Reactions, Reaction Products, Reaction in a Zip Bag*)

- FOSS Science Stories (*Mixtures and Solutions; A Salty Story; Earth Elements; Decompression Sickness; Sour Power; The Air You Breathe; What a Reaction!; What is Matter Made of?; Ask a Chemist; A periodic Table; The Metals; The History of Rubber)*
- Launch Labs (*How do you classify matter?; Can you follow the clues?; Where did it go?; What can colors tell you?; How can you see particles in matter?; Do liquid particles move?; Are volume and pressure of a gas related?; What's in there?; How many different things can you make?; How can objects be organized?; What properties make metals useful?; What are some properties of nonmetals?; How is the periodic table organized?; How is a compound different from its element?; How can atoms form compounds by gaining and losing electrons?; Where did it come from?; What combines with water?; Where's the heat?; What makes black ink black?; How are they different?; What color is it?)*
- *Design an Experiment to Solve a Crime* lab
- *Design an Experiment to Collect Data* lab
- *Communicate Your Knowledge About the Atom* lab
- *Alien Insect Periodic Table* lab
- *Ions in Solution* lab
- *Design and Experiment to Test Advertising Claims* lab
- *Can the pH of a solution be changed?* lab
- Webquests –(*Top Five Most Useful Element: Art of Neon; Recycling Plastics; Solutes, Solvents, and Solubility*)
- Brain POP: *Matter Changing State; Isotopes; Atomic Model; Acids and Bases*
- Identify independent, dependent, and constant variables in the contexts of experiments
- Use statistical representations for data (median, mode, range, outliers, box and whiskers plots, graphs, etc.)

Extensions:

- Language Extensions
  - Research citrus fruits
  - List descriptive words
- Math Extensions
  - Problem of the week
  - Calculate drink cost
- Science Extensions
  - Research diatomaceous earth
  - Research sodium chloride
  - Make saturated solutions with other chemicals
  - Grow crystals
  - Investigate limiting chemicals

Remediation:

- Teacher led small groups
- Examples of experiments to follow as an exemplar
- Repetition of science experiments/investigations
- Cooperative learning groups
- Differentiated Student Projects
- Focused study guides

Instructional Methods:

- Hands-on exploration within cooperative learning groups
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