

<b>Grade Level:</b>	6 <sup>th</sup> , 7 <sup>th</sup> or 8 <sup>th</sup>
<b>Class Title:</b>	Middle School Physical Science
<b>Subject:</b>	Science
<b>Class Description:</b>	<p>Students in middle school develop understanding of a wide range of topics in Physical Science that build upon science concepts from elementary school. Students will cover the sections of Matter and Its Interactions, Motion and Stability, Energy, Waves and their application in Technology for information transfer.</p> <p>This class will work toward one or more EALRs. This will be a year-long class, spanning the 2017-2018 school year.</p> <p>The estimated instructional hours for this class are ____per week</p>
<b>Learning Materials:</b>	List all materials.
<b>Learning Goals/ Performance Objectives:</b>	<p><b>PS1.A: Structure and Properties of Matter</b></p> <ul style="list-style-type: none"> <li>• Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (MS-PS1-1)</li> <li>• Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2),(MS-PS1-3)</li> <li>• Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. (MS-PS1-4)</li> <li>• In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. (MS-PS1-4)</li> <li>• Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1)</li> <li>• The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. (MS-PS1-4)</li> </ul> <p><b>PS1.B: Chemical Reactions</b></p> <ul style="list-style-type: none"> <li>• Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2),(MS-PS1-3),(MS-PS1-5)</li> <li>• The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5)</li> <li>• Some chemical reactions release energy, others store energy. (MS-PS1-6)</li> </ul> <p><b>PS3.A: Definitions of Energy</b></p> <ul style="list-style-type: none"> <li>• The term “heat” as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. (<i>secondary to MS-PS1-4</i>)</li> <li>• The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system’s material). The details of that relationship depend on the type of atom or molecule and the interactions among the atoms in the material. Temperature is not a direct measure of a system’s total thermal energy. The total thermal energy (sometimes called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material. (<i>secondary to MS-PS1-4</i>)</li> </ul> <p><b>ETS1.B: Developing Possible Solutions</b></p> <ul style="list-style-type: none"> <li>• A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (<i>secondary to MS-PS1-6</i>)</li> </ul> <p><b>ETS1.C: Optimizing the Design Solution</b></p> <ul style="list-style-type: none"> <li>• Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process - that is, some of the characteristics may be incorporated into the new design. (<i>secondary to MS-PS1-6</i>)</li> <li>• The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (<i>secondary to MS-PS1-6</i>)</li> </ul> <p><b>PS3.A: Definitions of Energy</b></p> <ul style="list-style-type: none"> <li>• Motion energy is properly called kinetic energy; it is proportional to the mass of the moving</li> </ul>

object and grows with the square of its speed. (MS-PS3-1)

- A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2)
- Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. (MS-PS3-3),(MS-PS3-4)

**PS3.B: Conservation of Energy and Energy Transfer**

- When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5)
- The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment. (MS-PS3-4)
- Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3)

**PS3.C: Relationship Between Energy and Forces**

- When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)

**ETS1.A: Defining and Delimiting an Engineering Problem**

- The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that is likely to limit possible solutions. (*secondary to MS-PS3-3*)

**ETS1.B: Developing Possible Solutions**

- A solution needs to be tested, and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet criteria and constraints of a problem. (*secondary to MS-PS3-3*)

**PS4.A: Wave Properties**

- A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1)
- A sound wave needs a medium through which it is transmitted. (MS-PS4-2)

**PS4.B: Electromagnetic Radiation**

- When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. (MS-PS4-2)
- The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. (MS-PS4-2)
- A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. (MS-PS4-2)
- However, because light can travel through space, it cannot be a matter wave, like sound or water waves. (MS-PS4-2)

**PS4.C: Information Technologies and Instrumentation**

- Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3)

A team of certificated teachers who are highly qualified in this subject matter has reviewed this WSLP.

**Learning Activities:**

- (Student Name) Read for 60 minutes for information on a topic each week
- (Student Name) will participate in conducting one experiment each week
- (Student Name) will complete one presentation and share conclusions about a project each month
- (Student Name) will complete a research project each month
- (Student Name) will complete \_\_\_pages per week/month in Science workbook
- (Student Name) will compare and contrast two objects (using a Venn diagram) each month
- (Student Name) will draw or label a diagram each month

(Student Name) will keep a list of vocabulary words for the topic of study each month

[Student's name] will keep a portfolio of weekly work samples and any written assessments to present to consultant at face-to-face meetings each month. Monthly assessments will be completed by the consultant/certified teacher. Monthly Progress will be marked satisfactory or unsatisfactory based on the professional judgment of the certified teacher using parent input, work samples, and monthly assessments.

**Progress  
Criteria/  
Methods of  
Evaluation:**

The listed activities will be reviewed each month between the certified teacher/consultant, parent and student. Student's work will be determined satisfactory when the student shows consultant evidence of at least one graded activity each month and one graded extension every three months. Each month the consultant/teacher will use his/her professional judgment to determine if the student will master the objectives by the end of the course.