

**Pacing Guide (Sept. 2017 – June 2018 )**  
**Grade: Middle School (6-8) Subject: Physical Science**

Pacing (Month)	Essential Standards	Unit Topic(s) and Essential Questions	Student Target Outcomes and Goals <i>SWBAT</i>	Focus Topics	Assessment	Resources	Catholic Identity
<b>September</b>	S2.1a, S2.2b	<b>Lab Safety</b> -Why is preparation important when carrying out scientific investigations?	-State and follow safety procedures -Demonstrate use of Metric rulers, Triple-beam balance, graduated cylinder, beaker, thermometer, spring scale -Properly use science equipment	-Correctly use Personal Protective Equipment  -Laboratory research techniques  -Scientific Methodology/ Hypothesis development	-Experiments  -Teacher observations  -Interactive Student Journal	-Safety Handbook in the textbook.  -Textbook  - Scientific Method Websites**	National Directory for Catechesis - Care for self and others
	S2.1b, S2.2b	<b>Scientific Method</b> - How do Scientists investigate the natural world?	-Identify appropriate SI units describing the physical properties of mass, volume, and density. -Identify the steps in the Scientific Method.	-Data Collection and Analysis  -Drawing conclusions and presenting findings  -Graphs, Charts, Tables	-Lab practical/ quizzes/reports  -Worksheets	- Videos ** (online/ DVD)	God’s Creation -Gn 1
	MS-PS1 PS1-1	<b>Matter and Its Interactions</b> -What is matter?	-Use graphs/charts -Identify atoms, molecules, elements, ions, & compounds -Model the relationship between protons, electrons, and neutrons in atoms. -Utilize the periodic table to determine pertinent data about an element	-Weights and Measures  -The Periodic Table of Elements.	-Develop a simple atom molecule model	-Periodic Table	Roger Bacon(c. 1214–1294) – Franciscan friar who is described as the forerunner to the modern scientific method
	PS P4.1.1d - P4.1.1j			-Atomic theory/structure of the atom  -Chemical formulas and chemical equations	-Model the Conservation of Mass in a chemical reaction  -Analyze the properties of a substance before and after it is involved in a chemical reaction	** <i>Guide to pertinent sites being developed</i>	
<b>October</b>	PS1-2	-How do substances interact with each other?	-Describe the physical characteristics of matter. -Explain chemical changes that occur when substances interact	-Balancing			

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<b>October</b>	PS1-5	-What is the Law of the Conservation of Matter?	-Determine the characteristics of an element by its location on the periodic table. -Identify matter as a mixture compound, or solution. -Describe the Law of Conservation of Matter. -Balance chemical equations.	-Physical properties and chemical properties of matter  -Homogeneous/Heterogeneous compounds	-Quizzes  -Experiments  -Teacher observations	-Textbook  -Videos ** (online/ DVD)  -Interactive websites**	United States Catholic Catechism for Adults -Appreciation and respect for the laws of nature
	PS1-3	-How are natural substances used to synthesis manmade materials?	-Define solute, solvent, and types of solutions -Classify chemical reactions as synthesis, replacement or decomposition -Define characteristics of a solid, liquid, gas, and plasma. -Define molecular structure and motion of particles in a Solid, Liquid, and Gas.	-Mixtures, compounds, and solutions  -Thermal energy (loss/gain) and the state of a material.  -Endothermic/exothermic reactions	-Describe how synthetic material made from natural resources impact society and the environment  -Develop a model of changes caused to particle motion, state, and temperature, when thermal energy is added/ removed	-Periodic Table  <i>** Guide to pertinent sites being developed</i>	
	PS1-4	-How does a change in thermal energy affect a substance?	-Define the changes in state of a material that gains/loses thermal energy. -Explain how chemical reactions yield new materials. -Explain how changes in state reflect the absorption/release of energy by a substance. -Explain the difference between temperature and thermal energy.	-Conservation of Matter  -States of matter; solids, liquids, gases, and plasma  -Volume and density	-Interactive Student Journal  -Lab practical/ reports		
<b>November</b>	MS-PS2	<b>Motion and Stability:</b>	Describe the process that a substance undergoes as				

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	PS2-1  PS2-2	<p><b>Forces and Interactions</b></p> <p>-What natural laws apply to objects that interact with one another?</p>	<p>thermal energy is gained or lost.</p> <p>Describe the difference between balanced and unbalanced forces. (Newton's First Law of Motion)</p> <p>-Identify and explain Newton's three Laws of Motion.</p> <p>-Describe how mass, force, and acceleration are related. (Newton's Second Law of Motion)</p> <p>-Calculate the change in force of an object given its mass and acceleration.</p> <p>-Differentiate between speed and velocity.</p> <p>-Graph the motion of an object as it accelerates.</p> <p>-Describe how an object's apparent motion is dependent on the observer's location.</p> <p>-Define when an object is in motion and what forces are acting upon that object.</p>	<p>-Newton's three Laws of Motion.</p> <p>-Balanced and unbalanced forces</p> <p>-Speed, velocity, apparent motion</p> <p>-Acceleration, velocity, and speed</p> <p>-Friction</p> <p>-Energy, work and power</p> <p>-Simple tools</p>	<p>-Design a safety system that addresses Newton's Third Law of Motion and two colliding objects</p> <p>-Design and experiment that shows an change in motion depends on the sum of the forces acting on that the mass of an object</p> <p>-Quizzes</p> <p>-Teacher observations</p> <p>-Interactive Student Journal</p> <p>-Worksheets</p>	<p>-Textbook</p> <p>-Videos ** (online/ DVD)</p> <p>-Interactive websites</p> <p><i>** Guide to pertinent sites being developed</i></p>	<p>United States Catholic Catechism for Adults</p> <p>-Appreciation and respect for the laws of nature</p>

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November	MS-PS2	<b>Motion and Stability: Forces and Interactions</b>  -Are forces found on Earth the same as on other objects in the universe?  -How is a gravitational field affected by an object's size and relationship with other objects?	-Demonstrate how changes in force, mass, and acceleration affect an object. -Develop a model that illustrates action/reaction forces (Newton's Third Law of Motion). -Investigate how technology can be used to protect against action/reaction forces. -Explain how friction and gravity are related. -Explore methods used to reduce friction. -Define how gravitational forces act on falling objects. -Describe how mass and distance affect gravitational attraction. -Provide evidence that forces exist between objects not in contact. -Explain how gravitational forces formed the solar system. -Define how magnetic forces interact. -Describe a magnetic field's shape and the benefits of Earth's magnetic field. -Describe pressure changes in	-Inertia and momentum  -Action and reaction forces  -Safety technology and everyday applications  -Types of friction  -Universal gravitational forces  -Magnetism, magnets, magnetic forces, magnetic fields  -Solar energy and magnetic interactions  -Measuring gases; volume, temperature, and pressure  -Boyle's Law	-Quizzes  -Experiments  -Teacher observations  -Interactive Student Journal  -Lab practical/reports  -Worksheets  -Develop an oral presentation that supports the argument that gravitational forces are attractive and mass dependent  -Research and	-Textbook  -Videos ** (online/ DVD)  -Interactive websites**  -Periodic Table  ** <i>Guide to pertinent sites being developed</i>	
	PS2-2						
	PS2-4						
December	PS2-3	-What affects the strength of electric and magnetic forces ?  -Are forces the same					
							Role of the Church in Scientific discoveries.

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<b>December</b>		<p>in all substances?</p> <p>-Why do fluids and gases behave differently under different conditions?</p>	<p>a fluid.</p> <p>-Describe how buoyant forces react and influence an object's density.</p> <p>-Describe how pressure, volume, and temperature affect the behavior of gases.</p> <p>-Explain Pascal's Principle. - Explain Bernoulli's Principle.</p> <p>-Explain how electrical charges interact.</p> <p>-Describe an electric field.</p> <p>-Explain how electrical currents are produced.</p> <p>-Differentiate between a conductor and an insulator</p> <p>-Explain how the difference in electrical charges creates electricity.</p> <p>-Describe the transfer of an electrical charge.</p> <p>-Explain what causes electric charges to flow in a circuit.</p> <p>-Describe how chemical reactions can be used to generate electricity.</p>	<p>-Charles's Law</p> <p>-Pressure changes related to altitude and depth</p> <p>-Buoyancy</p> <p>-Pascal's Principle</p> <p>-Bernoulli's Principle</p> <p>-Electrical forces</p> <p>-Electrical charges</p> <p>-Electrical currents</p>	<p>report on forces existing between objects that are not in contact with one another</p> <p>-Quizzes</p> <p>-Experiments</p> <p>-Teacher observations</p>	<p>-Videos ** (online/ DVD)</p> <p>-Interactive websites</p> <p><i>** Guide to pertinent sites being developed</i></p> <p>-Niagara Power Vista Field Trip</p>	

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January	PS2-3  PS2-5		<ul style="list-style-type: none"> <li>-Demonstrate that fields exist between objects that are not in contact.</li> <li>-Identify parallel and series circuits.</li> <li>-Explain how current flows in a parallel and series circuit.</li> <li>-Calculate resistance, voltage, and current using Ohm's Law.</li> <li>-Describe the characteristics of a magnetic field produced by a current.</li> <li>-Compare/contrast a permanent magnet and an electromagnet.</li> <li>-Design an experiment that demonstrates magnetic fields are affected by electric current.</li> <li>-Explain how generators use magnetic fields to produce electric currents.</li> <li>-Describe how electricity is delivered from the generating plant to the consumer.</li> </ul>	<ul style="list-style-type: none"> <li>-Circuits; parallel and series</li> <li> </li> <li>-Voltage and Amps</li> <li> </li> <li>-Resistance</li> <li> </li> <li>-Ohm's Law</li> <li> </li> <li>-Electromagnets, permanent magnets</li> <li> </li> <li>-Generation of electrical energy</li> <li> </li> <li>-Conventional and alternative energy sources</li> </ul>	<ul style="list-style-type: none"> <li>-Interactive Student Journal</li> <li> </li> <li>-Lab practical/reports</li> <li> </li> <li>-Worksheets</li> <li> </li> <li>-Quizzes</li> <li> </li> <li>-Experiments</li> <li> </li> <li>-Teacher observations</li> <li> </li> <li>-Interactive Student Journal</li> </ul>	<ul style="list-style-type: none"> <li>-Textbook</li> <li> </li> <li>-Videos ** (online/ DVD)</li> <li> </li> <li>-Interactive websites</li> <li> </li> <li>** <i>Guide to pertinent sites being developed</i></li> </ul>	
	MS-PS3  PS3-1	<b>ENERGY</b>  -What is Energy?	<ul style="list-style-type: none"> <li>-Describe kinetic energy and potential energy.</li> <li>-Describe how energy, work, and power are related.</li> <li>-Explain the effect that an</li> </ul>	<ul style="list-style-type: none"> <li>-Electrical Insulators</li> <li> </li> <li>-Thermal insulators</li> </ul>		<ul style="list-style-type: none"> <li>** <i>Guide to pertinent sites being developed</i></li> </ul>	

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February	PS3-2/ PS3-4	-What can mankind do to improve the use/ production of energy?	object's mass has on its kinetic energy. -Demonstrate how the position of an object affects its potential energy. -Describe how changing distance affects the strength of the energy between objects. -Describe the flow of thermal energy between objects. -Demonstrate how interacting objects can cause force to transfer energy from one object to another.	-Potential and Kinetic energy  -Thermal mass  -Heat transfer	-Quizzes  -Experiment; design, construct, and test a device insulates or transfers thermal energy	-Textbook  - Scientific Method Websites**	
	PS3-3/ PS3-5	-How can energy be used to improve living conditions?	-Define temperature and its three measurement scales. -Identify sources and everyday uses of energy. -Describe how different forms of energy are related. -State the Law of the Conservation of Energy. -Compare renewable and nonrenewable energy sources.	-Conduction, Convection, and Radiation  -Kelvin, Fahrenheit, and Celsius scales, conversions  -Uses for energy in daily life	-Teacher observations  -Interactive Student Journal  -Lab practical/ reports  -Worksheets	-Videos ** (online/ DVD)  -Periodic Table	
	PS3-4	-What impact does energy consumption have on the environment?	-Explain how technology can improve the delivery of energy. -Explain the advantages/ disadvantages of different forms of energy.	-Conservation of Energy  -Renewable and non-renewable sources of energy  -Pollution, waste treatment and environmental remediation	-Develop a presentation on kinetic energy being used to generate or transfer energy to or from an object	** <i>Guide to pertinent sites being developed</i>	Encyclical Letter Laudato Si' <a href="http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html">http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html</a>

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<b>March</b>	PS3-5	-How does a change in kinetic energy change the energy transferred to or from an object?	-Explain how one form of energy may be transformed into another. -Describe how an object's mechanical energy is determined. -Construct a model that demonstrates a change in energy transfer with a change in kinetic energy. -Identify the types and sources of solar, thermal, chemical, mechanical, thermonuclear, photoelectric, electromagnetic, kinetic, and potential energy.	-Energy transformation  -Mechanical energy  -Turbo/Hydro/Solar energy  -Energy generation and transformation  -Environmental impact of energy production.	-Quizzes  -Experiments  -Graph and describe the relationship between kinetic energy, mass, and speed of an object  -Interactive Student Journal  -Lab practical/reports  -Worksheets	-Videos ** (online/ DVD)  -Interactive websites  <i>** Guide to pertinent sites being developed</i>	
	PS4-1	<b>Waves and Their Applications in Technologies for Information Transfer</b>  -What are the properties of waves?  -What is the electro-	-Describe two types of mechanical waves. -Describe the basic properties of waves. -Define frequency and wavelength. -Calculate the wave period and wave speed -Explain how electromagnetic energy is related to wavelength and frequency. -Explain how reflection, refraction, and diffraction	-Transverse, Longitudinal, and Torsional waves.  -Energy transfer of waves  -Amplitude, Frequency, and Wavelength  -The Electromagnetic Spectrum.	-Construct a mathematical	-Textbook	



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April	PS4-2	magnetic spectrum and how does it influence our lives?	change a wave's direction. -Describe different types of interference. -Describe how different types of electromagnetic energy are used. -Describe how different types of electromagnetic energy -Describe how visible light forms images in the human eye. -define the visual properties transparent, translucent, and opaque. -Explain how waves travel through different types of materials. -Differentiate between constructive and destructive interference. -Identify the types of seismic waves. -Research how technology has improved safety related to seismic activity.	-Wave periods and wave speed  -Visible Light; ROYGBIV  -Reflection, Refraction, and Diffraction  -Light behavior through transparent, translucent, and opaque substances.  -Constructive and destructive interference.  -P waves, S waves, and Surface waves.  -Engineering for Earthquakes  -Soundwaves -Calculating the speed of sound.	model of the transfer of energy based on the amplitude of a wave  -Quizzes  -Teacher observations  -Interactive Student Journal  -Model the reflection, absorption, and transmission of waves through various material  -Lab practical/ reports  -Worksheets  -Quizzes	-Videos ** (online/ DVD)  -Interactive websites  <i>** Guide to pertinent sites being developed</i>	Art and color are integral parts of our Catholic celebrations
		-How do different types of waves affect the way we interact with our environment?  -What is sound?  -How has our use of	-Define how sound waves interact. -Identify the factors that affect the speed of sound. -Explain the Doppler Effect.				-Textbook



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