

PHYSICAL SCIENCE	
Energy	Fourth Grade
SCRIPTURE	
<p>“On his journey, as he was nearing Damascus, a light from the sky suddenly flashed around him. He fell to the ground and heard a voice saying to him, ‘Saul, Saul, why are you persecuting me?’” Acts 9:3-4</p>	
STANDARD	
<p>Always searching for truth, beauty, and goodness in God’s creation:</p> <p>S. 1. Use evidence to construct an explanation relating the speed of an object to the energy of that object. (Assessment does not include quantitative measurements of changes in the speed of an object or on any precise quantitative definition of energy.)</p> <p>S. 2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. (Assessments don’t include quantitative measurements of energy.)</p> <p>S. 3. Ask questions and predict outcomes about the changes in energy that occur when objects collide.</p> <p>S. 4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.</p>	
EXAMPLES	
<p>Giovanni di Casali Franciscan friar who provided graphical analysis of the motion of accelerated bodies,</p>	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> <li>1. What is the Law of Conservation of Mass and Energy?</li> <li>2. What effect does changing the speed of an object have on the energy the that object possesses?</li> <li>3. What forces can impact the speed of an object?</li> <li>4. What are some examples from the Bible in which God uses heat, electricity, sound, or light to move or change objects?</li> </ol>	
VOCABULARY TERMS	
<ol style="list-style-type: none"> <li>1. Velocity</li> <li>2. Acceleration</li> <li>3. Inertia</li> <li>4. Momentum</li> <li>5. Friction</li> </ol>	
ACTIVITIES	
<p>S.1. Baseball bat and ball</p> <ul style="list-style-type: none"> <li>• Students should hit baseballs (tennis balls/wiffle balls) thrown at different speeds. Students should predict how the speed of the pitch impacts the distance the ball is hit. Measure the distance each travels.</li> </ul> <p>S.2. Dark cloth/White cloth with thermometers</p> <ul style="list-style-type: none"> <li>• Put a thermometer in a black glove and a second thermometer in a white glove. Let them sit in the sun and record the temperature at regular intervals. Discuss the impact of this information on clothing choices in the winter and summer.</li> </ul> <p>S.3. Marbles</p>	

- Students should design a ramp system inside a shoe box that slow a marble down (but not stop it). As the marble exits the ramp system, it will strike a second marble. Measure the distance the second travels.

#### S.4. Circuits

- Students should design a circuit that accomplishes a task (light a light bulb, run a small fan, sound an alarm)

<b>PHYSICAL SCIENCE</b>	
Waves and their Applications in Technologies for Information Transfer	Fourth Grade
<b>SCRIPTURE</b>	
<p>“Then I heard something like the sound of a great multitude or the sound of rushing water or mighty peels of thunder as they said, Alleluia! The LORD has established His reign, (our) God, the almighty.” Revelations 19:6</p>	
<b>STANDARD</b>	
<p>Always searching for truth, beauty, and goodness in God’s creation:</p> <p>S. 1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.</p> <p style="padding-left: 40px;">a. Examples of models could include diagrams, analogies, and physical models using rope to illustrate wavelength and amplitude of waves. Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.</p> <p>S. 2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</p> <p style="padding-left: 40px;">a. Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.</p> <p>S. 3. Generate and compare multiple solutions that use patterns to transfer information. a. Examples of solutions could include drums sending coded information through sound waves, singing hymns in Mass using sound waves, using a coordinate grid and directions with off/on for each box representing black and white to send information about a picture, and using Morse code to send text.</p>	
<b>EXAMPLES</b>	
<p>Augustin-Jean Fresnel was a French civil engineer and physicist whose research in optics led to the almost unanimous acceptance of the wave theory of light</p> <p>Roger Bacon was an English philosopher and Franciscan friar who placed considerable emphasis on the study of nature through empiricism. He discussed physiology of eyesight, the anatomy of the eye and the brain, light, distance, position, size, direct vision, reflected vision, refraction, mirrors, and lenses.</p>	
<b>ESSENTIAL QUESTIONS</b>	
<ol style="list-style-type: none"> <li>1. How does the appearance of a transverse wave (light) differ from a longitudinal wave (sound)?</li> <li>2. What happens to light when it hits an object?</li> <li>3. Light and sound waves have similarities and differences, when would light waves be more effective than sound waves and when would sound waves be more effective than light waves?</li> <li>4. What are some examples of using waves to praise God?</li> </ol>	
<b>VOCABULARY TERMS</b>	
<ol style="list-style-type: none"> <li>1. Wavelength</li> <li>2. Amplitude</li> <li>3. Reflect</li> <li>4. Absorb</li> <li>5. Transmit</li> <li>6. Frequency</li> </ol>	
<b>ACTIVITIES</b>	

S.1. Jump Rope /Spring (Slinky)

- With one student holding each end of the jump rope, simulate a transverse wave.
- Repeat using a spring or slinky to simulate longitudinal waves.

S.2. Diagram Model

- Students should construct diagram models of light reflection, absorption, and transmission using arrows for light rays.

S.3. Morse code

- Using flashlights and morse code, students should send Bible passages to each other across the room.

LIFE SCIENCE	
From Molecules to Organisms: Structures and Processes	Fourth Grade
SCRIPTURE	
<p>“A good tree does not bear rotten fruit, nor does a rotten tree bear good fruit. For every tree is known by its own fruit. For people do not pick figs from thorn bushes, nor do they gather grapes from brambles.” Luke 6:43-44</p>	
STANDARD	
<p>S. 1. Construct an argument that the plants and animals that God has created have internal and external structures that function to support survival, growth, behavior, and reproduction.</p> <p>a. Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin. Assessment is limited to macroscopic structures with plant and animal systems.</p> <p>S. 2. Use a model to describe that animals receive different types of information through their senses, process the information in their brains, and respond to the information in different ways.</p> <p>a. Emphasis is on systems of information transfer. Assessment does not include the mechanism by which the brain stores and recalls information or the mechanisms of how sensory receptors function.</p>	
EXAMPLES	
<p>Georges-Louis Leclerc, Comte de Buffon was a French naturalist who explored the struggle for survival in similar environmental conditions in different regions could produce distinct organisms.</p>	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> <li>1. What structures help organisms survive in their environments?</li> <li>2. How do animals use their senses to survive in their environments?</li> <li>3. God has created a variety of life on our planet, what are some unusual examples of organisms with adaptations?</li> </ol>	
VOCABULARY TERMS	
<ol style="list-style-type: none"> <li>1. Adaptation</li> <li>2. Camouflage</li> <li>3. Exoskeleton</li> <li>4. Herbivore</li> <li>5. Carnivore</li> <li>6. Omnivore</li> <li>7. Fur</li> <li>8. Feathers</li> <li>9. Scales</li> </ol>	
ACTIVITIES	
<p>S.1. Compare and contrast alpine plants with desert plants.</p> <p>S.1. Your Bird</p> <ul style="list-style-type: none"> <li>• Each student should design their own bird. They should draw it and describe it. The bird should have characteristics that allow it to survive and thrive in the environment in which they place it.</li> </ul> <p>S.2. Mystery Boxes</p> <ul style="list-style-type: none"> <li>• Place safe items in different boxes. Allow students to smell, listen, and touch (no looking or tasting) to try to determine what each item is.</li> </ul>	

<b>EARTH AND SPACE SCIENCE</b>	
Earth's Place in the Universe	Fourth Grade
<b>SCRIPTURE</b>	
<p>"Then God said: Let the water under the sky be gathered into a single basin, so that the dry land may appear. And so it happened: the water under the sky was gathered into its basin, and the dry land appeared. God called the dry land 'earth,' and the basin of water he called 'sea.' God saw that it was good." Genesis 1:9-10</p>	
<b>STANDARD</b>	
<p>S. 1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes God has directed in a landscape over time.</p> <p>a. Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock. Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time (first, next, then, later, last).</p>	
<b>EXAMPLES</b>	
<p>Nicolas Steno was a Danish scientist, a pioneer in geology who became a Catholic bishop in his later years. He questioned explanations for the idea that fossils grew in the ground and explanations of rock formation. His investigations and his subsequent conclusions on fossils and rock formation have led scholars to consider him one of the founders of modern stratigraphy and modern geology</p>	
<b>ESSENTIAL QUESTIONS</b>	
<ol style="list-style-type: none"> <li>1. How are fossils formed?</li> <li>2. What clues has God left us in the layers of rock that tell us about Earth's environment in the past?</li> </ol>	
<b>VOCABULARY TERMS</b>	
<ol style="list-style-type: none"> <li>1. Fossils</li> <li>2. Sedimentary</li> <li>3. Igneous</li> <li>4. Metamorphic</li> <li>5. Magma</li> </ol>	
<b>ACTIVITIES</b>	
<p>S.1.Future Fossils</p> <ul style="list-style-type: none"> <li>• Students should be shown pictures of various formations (sand dunes, canyons, mountains, etc.) as well as fossils (or shown actual fossils if possible). Then students are asked to explain what fossils a million years from now might show about our world today.</li> </ul>	

EARTH AND SPACE SCIENCE	
Earth's Systems	Fourth Grade
SCRIPTURE	
"Mountains fall and crumble, rocks move from their place, And water wears away stone, and floods wash away the soil of the land" Job 14:18-19	
STANDARD	
<p>S. 1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation on God's creation.</p> <p>a. Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow. Assessment is limited to a single form of weathering or erosion.</p> <p>S. 2. Analyze and interpret data from maps to describe patterns of Earth's features.</p> <p>a. Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.</p>	
EXAMPLES	
St. Barbara secretly became Christian. She gazed upon the hills and admired God's creation. She refused to renounce Jesus even after her father had her tortured. She was martyred. She is the patroness of miners.	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> <li>1. How can erosion and weathering explain the rock formations we see today?</li> <li>2. How can erosion be slowed?</li> <li>3. God's creation is changing overtime through erosion and weathering; when is this a positive and when is it a negative?</li> </ol>	
VOCABULARY TERMS	
<ol style="list-style-type: none"> <li>1. Erosion</li> <li>2. Weathering</li> <li>3. Freezing Cycle</li> <li>4. Tectonic Plates</li> </ol>	
ACTIVITIES	
<p>S.1. School and Church Grounds</p> <ul style="list-style-type: none"> <li>• The students should explore the school and Church campus to find signs of erosion and weathering. They should brainstorm how this can be slowed or halted.</li> </ul> <p>S.1. Dirt box</p> <ul style="list-style-type: none"> <li>• Using a box filled evenly with dirt, raise one end and pour water down the middle. Students should describe what they see, Vary the angle of the slope and discuss the impact of the angle change.</li> </ul> <p>S.2. Ring of Fire</p> <ul style="list-style-type: none"> <li>• Using maps of continental boundaries, active volcanoes, mountains, and earthquakes, outline the Pacific Ring of Fire.</li> </ul>	

EARTH AND SPACE SCIENCE	
Earth and Human Activity	Fourth Grade
SCRIPTURE	
<p>“The wind blows where it wills, and you can hear the sound it makes, but you do not know where it comes from or where it goes; so it is with everyone who is born of the Spirit.” John 3:8</p>	
STANDARD	
<p>S. 1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment God created.</p> <p>a. Examples of renewable energy sources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels, and fissile materials (nuclear fission). Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels, water pollution from spilled oil.</p> <p>S. 2. Generate and compare multiple solutions to reduce the impact of natural Earth processes on humans.</p> <p>a. Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.</p>	
EXAMPLES	
<p>St. Kateri Tekakwitha is the first Native American to be recognized as a saint by the Catholic Church .She is the patroness of ecology and the environment.</p>	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> <li>1. What is the difference between renewable energy resources and fossil fuels?</li> <li>2. How does the use of fossil fuels impact the environment?</li> <li>3. As God’s stewards of the planet, what can we do to lessen our negative impact on the environment?</li> </ol>	
VOCABULARY TERMS	
<ol style="list-style-type: none"> <li>1. Fossil fuels</li> <li>2. Fission</li> <li>3. Solar</li> <li>4. Hydroelectric</li> <li>5. Renewable energy</li> </ol>	
ACTIVITIES	
<p>S.1. Fossil Fuels</p> <ul style="list-style-type: none"> <li>● Students should identify fossil fuels that are currently in use and the impact the use of these fuels has on the environment. Students should investigate why fossil fuels are used and how renewable energy could be made more appealing. They should then design a city that uses renewable energy resources.</li> </ul> <p>S.2 Earth Attacks!</p> <ul style="list-style-type: none"> <li>● Groups of students should each be given a natural disaster (earthquake, volcanic eruption, flood, hurricane, or tidal wave). They should research how their particular disaster has impacted humans and what humans can do to combat the effects of that disaster. Then they should make sure that their city (from S.1.) is designed to withstand the disaster. Then they should write a prayer for those who have or are suffering through that disaster.</li> </ul>	