

PHYSICAL SCIENCE	
Matter and its Interactions	FIFTH GRADE
SCRIPTURE	
<p><i>For in him were created all things in heaven and on earth, the visible and the invisible...</i> Colossians 1:16</p> <p><i>Through him all things were made; without him nothing was made that has been made.</i> John 1:3</p>	
STANDARD	
<p>God has created all things, visible and invisible. As we stand in awe of our Creator, we seek to understand Him through his creation.</p> <p>S. 1. Develop a model to describe that matter is made of particles too small to be seen.</p> <p>a. Examples of evidence could include adding air to expand a balloon/ball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.</p> <p>S. 2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of the matter is conserved.</p> <p>a. Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances. Assessment does not include distinguishing mass and weight.</p> <p>S. 3. Make observations and measurements to identify materials based on their properties.</p> <p>a. Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces and solubility; density is not intended as an identifiable property. Assessment does not include density or distinguishing mass and weight.</p> <p>S. 4. Conduct an investigation to determine whether mixing two or more substances results in new substances.</p>	
EXAMPLES	
<p>Antoine Laurent Lavoisier - French chemist and lawyer, Lavoisier studied mixtures, compounds, and solutions, with the intent to identify and explain their properties. He was raised in a pious Catholic family and held to his faith throughout his life.</p>	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> How can one explain the structure, properties and interactions of matter? What makes up all of the things we see around us? How can we observe and measure matter that cannot be seen? What forms can matter take? Does the amount of matter change when it changes form? What properties does matter have? How can we identify matter based on its properties? How do substances interact? Is a new substance always formed? Why do you think that the universe was created so that matter should be conserved? If we cannot see God, what are some ways we can know and feel his presence? 	

VOCABULARY TERMS

- Matter
- Particles
- Solid
- Liquid
- Gas
- Properties
- Conservation of Matter
- Physical Change
- Chemical Change
- Model
- Weight
- Measurements
- Volume
- Density
- Temperature
- Substances
- Solutions
- Mixtures

STREAM ACTIVITIES

- Have students create a dance that demonstrates how molecules change during phase changes from solid to liquid to gas.
- Create a piece of art that models the spacing of molecules in a solid, liquid and gas.
- Make lemonade from mix. Weigh the water and lemonade powder and then weigh the final solution. Was matter conserved?
- Conduct “Barf” Bag lab to demonstrate physical and chemical changes. Weigh the bag at the beginning and end to see if matter was conserved during a chemical change.
<https://www.teacherspayteachers.com/Product/Barf-Bag-Lab-Alcoholic-Fermentation-Activity-1886085>
- As Creator of the universe, God has wonderfully designed it with rules and principles that allow us to understand our world. Have students write their own psalm to praise God for how He created matter and how it behaves. For an example see
<https://scienceandbelief.org/2014/02/27/what-does-christ-have-to-do-with-chemistry/>

PHYSICAL SCIENCE	
Motion and Stability: Forces and Interactions	FIFTH GRADE
SCRIPTURE	
<i>He is before all things, and in Him all things hold together.</i> Colossians 1:17	
<i>Draw near to God, and He will draw near to you.</i> James 5:8	
STANDARD	
S. 1. Just as God seeks to draw us to Him, support an argument that the gravitational force exerted by Earth on objects is directed down. a. Clarification - "down" means toward the center of the Earth.	
EXAMPLES	
Jean-Felix Picard (1620-1682) was a French Jesuit priest and astronomer. Fr. Picard's achievements include being the first to accurately measure the size of the earth and improvements in scientific instruments that allowed Isaac Newton to develop his theory of universal gravitation.	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> 1. What is gravity? 2. How can we observe this force? 3. What do we mean when we say that gravity makes things fall down? 4. In what ways does God draw us to him? 	
VOCABULARY TERMS	
<ul style="list-style-type: none"> ● Gravity ● Gravitational Force ● Force ● Interaction ● Speed 	
STREAM ACTIVITIES	
<ul style="list-style-type: none"> ● Build a gravity spinner toy (https://teachbesideme.com/gravity-spinner-toy/) test it without the weights and then add them. Why does the toy only work when it is weighted? ● After learning about gravity have students write a story or create a comic strip about what would happen if Earth suddenly lost gravity. Have students share their stories with classmates and discuss. ● Have a discussion or have students write a reflection on how God draws us to him. 	

PHYSICAL SCIENCE	
Energy	FIFTH GRADE
SCRIPTURE	
<i>I am the light of the world. Whoever follows me will not walk in darkness, but will have the light of life.</i> John 8:12	
<i>God is present as my helper; the Lord sustains my life.</i> Psalm 54:6.	
STANDARD	
<p>S. 1. As God uses the image of light to represent how He sustains us, use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.</p> <p>a. Examples of models could include diagrams and flowcharts.</p>	
EXAMPLES	
<p>Antoine-Laurent de Lavoisier (1743-1794) was a French Catholic scientist known as the "Father of Chemistry," but his work encompassed a number of fields, including biology. His discovery of Oxygen and Hydrogen paved the way for future scientists to discover and explain the process of photosynthesis.</p>	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> How do plants obtain food? What is the food chain and where does the energy to start the food chain come from? How is a food web different from a food chain? What is the difference between a producer and a consumer? What role do decomposers play in cycling matter through the biosphere? Matter and energy cycle through the food web. What other natural cycles can you identify? Why do you think God set up creation in this way? 	
VOCABULARY TERMS	
<ul style="list-style-type: none"> Energy Food Web Food Chain Cycle Producer Consumer Decomposer 	
STREAM ACTIVITIES	
<ul style="list-style-type: none"> Using a flow chart model the flow of energy in given meals back to the sun. <ul style="list-style-type: none"> Science & Math Collaboration: Create varying types of graphs to display the total number of places removed specific food is from its original energy source. Create a poster that illustrates this flow of energy. Play the Photosynthesis Song to help students learn about the process. https://www.uwsp.edu/cnr-ap/KEEP/Documents/Activities/Food_Chain_Game.pdf 	

LIFE SCIENCE	
From Molecules to Organisms: Structures and Processes	FIFTH GRADE
SCRIPTURE	
<i>...The seed is the word of God. Luke 8:11</i>	
The Parable of the Sower Mark 4	
STANDARD	
<p>S. 1. Always searching for truth, beauty and goodness in God's creation, support an argument that plants get the materials they need for growth chiefly from air and water.</p> <p>a. Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.</p>	
EXAMPLES	
James Britten was a Catholic Botanist who was the editor of the "Journal of Botany" in England for 45 years and supported and disseminated research on plants and plant growth.	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> 1. What do plants need to grow? 2. Can you grow a plant without one of these necessities, air, water, soil, sunlight? 3. How is faith like a seed, and what does it need to grow and flourish? 	
VOCABULARY TERMS	
<ul style="list-style-type: none"> ● Organism ● Species ● Photosynthesis ● Needs ● Nutrients ● Growth ● Plant Matter ● Waste Matter ● Soil 	
STREAM ACTIVITIES	
<ul style="list-style-type: none"> ● Grow plants outside of soil; <ul style="list-style-type: none"> ○ Science & Math Collaboration: Measure the height of the plant(s) & based on the measurements, convert the height into varying forms of measurements; ○ Science & Math Collaboration: Create varying types of graphs/tables to display the growth changes in students' plant growth. 	

LIFE SCIENCE	
Ecosystems: Interactions, Energy, and Dynamics	FIFTH GRADE
SCRIPTURE	
<i>There is an appointed time for everything, and a time for every affair under the heavens. A time to give birth, and a time to die; a time to plant, and a time to uproot the plant.</i> Ecclesiastes 3:1-2.	
STANDARD	
<p>S. 1. Giving God glory for how He has ordered all things, develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.</p> <p>a. Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.</p>	
EXAMPLES	
Annie Chambers Ketchum a Catholic botanist who published <i>Botany for academies and colleges: consisting of plant development and structure from seaweed to clematis.</i>	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> What is the difference between energy and nutrients? Plants get their energy from the sun, where do they get the materials they need for growth and other life processes? How are these materials recycled through an ecosystem? How has God provided for his creatures? How does God provide for us? 	
VOCABULARY TERMS	
<ul style="list-style-type: none"> Organism Species Ecosystem Environment Matter Cycle Needs Photosynthesis Food Chain Food Web Producer Consumer Decomposer 	
STREAM ACTIVITIES	
<ul style="list-style-type: none"> Listen to & discuss “Turn! Turn! Turn!” by The Byrds. Write a reflection on how the song relates to the idea of energy transfer & our cycle of resources. To demonstrate that producers form the base of the food chain and that energy is lost at each level, play the food chain game. https://www.uwsp.edu/cnr-ap/KEEP/Documents/Activities/Food_Chain_Game.pdf 	

- Design a landscape plan that will house a healthy, balanced ecosystem that includes native plants & animals, found in the same food web.
 - PBL & Math Integration: Draw landscape plans to scale;
 - PBL & ELA Integration: Present landscape plans as timed speeches/presentations;
 - PBL & Art/Engineering Integration: Create a physical prototype of the landscape plan.

EARTH AND SPACE SCIENCE	
Earth's Place in the Universe	FIFTH GRADE
SCRIPTURE	
<i>Look up at the sky and count the stars if you can... Genesis 15: 5</i>	
<i>O Lord, our Lord... When I see your heavens, the work of your fingers, the moon and stars that you set in place --- What are humans that you are mindful of them, mere mortals that you care for them? ...O Lord, our Lord, How awesome is your name through all the earth! Psalm: 8-10</i>	
STANDARD	
<p>S. 1. In wonder at the scale of God's universe, support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.</p> <p>S. 2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.</p>	
EXAMPLES	
Fr. Georges Lemaître (1894-1966) was a Catholic priest and astronomer from Belgium who was the first to calculate the expansion of the universe, what is now known as Hubble's Law. He also proposed what has become known as the "Big Bang Theory" of the origin of the universe.	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> How does the sun compare with other stars? Why does the sun appear so different than other stars? How does distance affect a star's appearance? What patterns can we observe as a result of Earth's rotation and its revolution around the sun? What role have the stars played in the story of our faith? 	
VOCABULARY TERMS	
<ul style="list-style-type: none"> Apparent Brightness Absolute Brightness Sun Star Planet Earth Moon Orbit Rotate/Rotation Revolve/Revolution Axis 	
STREAM ACTIVITIES	
<ul style="list-style-type: none"> Students research sundials, then design and build a working sundial. Use the sundial to investigate how shadows change throughout the day. Perhaps have students decorate 	

their sundials as in this Aztec sundial project.

<https://www.education.com/activity/article/aztec-sundial/>

- Students create a song and dance to demonstrate their understanding of orbit, rotation and revolution.
- Students brainstorm why certain stars appear brighter and test their ideas using flashlights. Ex: <https://betterlesson.com/lesson/639839/what-affects-the-brightness-of-star>
- Students will create and use a star wheel to show how the night sky changes. Ex: <http://highhillhomeschool.blogspot.com/2014/01/astronomy-for-kids-week-1-star-map.html>
- Research information on the star that guided the wise men to Bethlehem. What is known about it? Was it a star? What made it so bright?

EARTH AND SPACE SCIENCE	
Earth's Systems	FIFTH GRADE
SCRIPTURE	
The Story of Creation Genesis 1: 6-12.	
STANDARD	
S. 1. Marveling in God's creative genius, develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.	
a. Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through water and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.	
S. 2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	
EXAMPLES	
Blessed Niels Stenson - a Danish anatomist and priest, Stenson was known as the "Father of Geology" and was the first to explain petrifications in the earth.	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> 1. What do we mean by the spheres of the Earth? 2. How do these spheres interact with one another? 3. As part of the biosphere, how are humans interconnected with the rest of creation? 4. How much of Earth's water is fresh water and why is this resource so important? 5. What threats does our fresh water supply face? 	
VOCABULARY TERMS	
<ul style="list-style-type: none"> ● Biosphere <ul style="list-style-type: none"> ○ Vegetation ● Geosphere <ul style="list-style-type: none"> ○ Molten Rock ○ Sediments ○ Landform ● Hydrosphere <ul style="list-style-type: none"> ○ Ocean ○ Glacier ○ Stream ○ Lake ○ Wetlands ○ Freshwater ○ Saltwater ● Atmosphere <ul style="list-style-type: none"> ○ Climate ○ Weather 	

STREAM ACTIVITIES

- Take a walk around the school property and have students write down as many things as they can from each sphere. When you return to the classroom have students share what they observed. The psalmist said “This is the day the Lord has made; We will rejoice and be glad in it.” Ask students to share what they saw in nature that made them happy.
- Have students build a terrarium to see how the spheres interact in a closed system. How is water recycled and used?

EARTH AND SPACE SCIENCE	
Earth and Human Activity GRADE	FIFTH
SCRIPTURE	
<i>Thus should one regard us: as servants of Christ and stewards of the mysteries of God. Now it is of course required of stewards that they may be found trustworthy.</i> 1 Corinthians 4:1-2.	
STANDARD	
S. 1. Knowing that we are stewards of God's creation, obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	
EXAMPLES	
St. Kateri Tekakwitha was canonized by Pope Benedict XVI on Oct. 21, 2012. She is the patroness of ecology and the environment, people in exile and Native Americans. St. Francis of Assisi is the patron saint of ecologists.	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> God has made us stewards of the Earth and its resources. How can we fulfill this responsibility? How can science help us to learn about the environment and provide solutions to help us protect it? 	
VOCABULARY TERMS	
<ul style="list-style-type: none"> Industry Agriculture Conservation Resources Communities Environment 	
STREAM ACTIVITIES	
<ul style="list-style-type: none"> Research carbon footprints and create a poster or PSA to teach others how to reduce their carbon footprint. Have students plan an Earth Day activity that incorporates the idea of stewardship of the Earth. Students research the effects of oil spills and design and test different methods of clean up. Ex: http://scienceafterschool.blogspot.com/2012/07/oil-spill-connecting-stem-activities-to.html 	

ENGINEERING	
Engineering Design	FIFTH GRADE
SCRIPTURE	
<i>Thus says God, the Lord, who created the heavens and stretched them out, who spread out the earth and what comes from it, who gives breath to the people upon it.</i> Isaiah 42:5	
<i>For we are what he has made us, created in Christ Jesus for good works, which God prepared beforehand to be our way of life.</i> Ephesians 2:10	
STANDARD	
<p>Inspired by the Creator of the Universe:</p> <p>S. 1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.</p> <p>S. 2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem</p> <p>S. 3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</p>	
EXAMPLES	
St. Patrick is the patron saint of engineers. He brought Roman building techniques to Ireland such as the use of lime mortar and arches to Ireland which were used to build churches.	
ESSENTIAL QUESTIONS	
<ol style="list-style-type: none"> How do engineers identify problems and design and test solutions? What constraints do engineers have to work with when designing a project? What can we learn from nature about good design? Why is God the Great Designer? 	
VOCABULARY TERMS	
<ul style="list-style-type: none"> Engineering design cycle Brainstorm Plan Collaborate Evaluate Modify Specifications Budget Variables Prototype Model 	
STREAM ACTIVITIES	
<ul style="list-style-type: none"> Initiate monthly STREAM days with an engineering challenge tied to curriculum or to the season. Ex: https://frugalfun4boys.com/awesome-stem-challenges/ Make sure students have time to analyze their prototype and make and test refinements to their original designs. Give groups a “budget” for supplies for a STREAM challenge so they must plan to use materials efficiently. 	

- Give a STREAM challenge and have students (or different groups) test and compare independent variables.
- Look at examples of good design in nature and how that can be applied to solve human design problems.
- Learn about St. Patrick's contributions to building churches in Ireland. Have students build an arch using sugar cubes and glue.