

COURSE INFORMATION

Grade Level: 5

Length: Full Year

ESSENTIAL UNDERSTANDING

In 5th grade, students will be exposed to a variety of topics. Students will be exposed to 5 different science strands: structure and property of matter, matter and energy in organisms, space systems, earth's systems, and engineering and design. Overall, they should be able to read and understand fifth grade level science text as well as conduct investigations into the different strands in order to increase their understanding of the topics.

COURSE OBJECTIVES

1. Literary skills will be applied to science non-fiction text.
2. Designing and conducting investigations and/or experiments will be utilized.
3. Use and analyze texts, experiments, investigations, and visual sources in order to increase understanding.
4. Have a basic understanding of matter, physical vs. chemical change, and properties of matter.
5. Understand that our sun is a star and be able to relate how distance affects brightness of stars.
6. Explain how gravitational force works.
7. Be able to use graphs or displays to relay information on how the the earth and/or sun relationship affects daily changes to life.
8. Have a basic understanding of all the spheres of earth (geosphere, hydrosphere, biosphere, and atmosphere) and how the all the spheres interact with one another.
9. Relay information on the amounts of water on earth and how this affects life in different locations.
10. Design, investigate, and use ideas on how to protect earth's environments.
11. Defend why it is true that all energy used in food was once energy from the sun.
12. Defend why it is true that plants get most of what they need to survive from air and water.
13. Explain the relationship between animals, plants, and decomposers in the environment.
14. Use engineering and design to make models and improve them, carry out demonstrations, and use experiments/investigations to prove/disprove hypotheses.

STUDENT OBJECTIVES

1. I can use reading skills to comprehend science text.
2. I can design and carry out investigations and experiments in order to understand content and to prove/disprove a hypothesis.
3. I can explain matter, physical vs. chemical change, and properties of matter.
4. I can relate how distance affects brightness of stars.
5. I can explain how gravitational force works.
6. I can use graphs or displays to relay information on how the the earth's rotation/revolution affects daily changes to life.

7. I can describe all the spheres of earth (geosphere, hydrosphere, biosphere, and atmosphere) and how the spheres interact with one another.
8. I can relay information on the amounts of water on earth and how this affects life based on water availability.
9. I can design, investigate, and use ideas on how to protect earth's environments.
10. I can defend why it is true that all energy used in food was once energy from the sun.
11. I can defend why it is true that plants get most of what they need to survive from air and water.
12. I can explain the relationship between animals, plants, and decomposers in the environment.

Pacing Guide and Timeline with Standard Included:

Trimester 1

| Dates/Resource | Standard and focus | Experiments | Projects |
|---|--|--|--|
| <p>(2 weeks) <i>Resource: Science text "Scientific Method"</i></p> | <p><i>Engineering and Design</i></p> <ul style="list-style-type: none"> ● Explain the scientific method and how to apply ● Conduct experiments/increase interest in Science ● Change variables | <ul style="list-style-type: none"> ● Marshmallow Tower challenge ● design the best paper airplane ● cup and band experiment <ul style="list-style-type: none"> - using only rubber bands to move cups ● Lego WeDo <ul style="list-style-type: none"> -how to use intro | |
| <p>(3 weeks) <i>Resources:</i> -L.1 Earth and Sun -L.4 Stars -Night Sky App -Weight on other planets</p> | <p><i>Space Systems (5-PS2-1, 5-ESS1-1, 5-ESS1-2)</i></p> <ul style="list-style-type: none"> ● Why does everything on Earth go "down"? ● Chart shadow length, why is it getting shorter? ● Constellation patterns and changes to what we see in the night sky ● Brightness of stars and what affects the brightness (distance, type, age etc) | <ul style="list-style-type: none"> ● Egg drop <ul style="list-style-type: none"> - design a holder to withstand a 7ft fall. (Ties into gravity)* ● Measuring shadow length* ● Flashlight experiment for stars | <ul style="list-style-type: none"> - Tie into Native American constellations* - Northern hemisphere constellations - Build Tepees |

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|--|---|--|--|
| <p>(2 weeks) Resource: Science text “Scientific Method”</p> | <p>Engineering and Design</p> <ul style="list-style-type: none"> ● Explain the scientific method and how to apply ● Conduct experiments/increase interest in Science ● Change variables | <ul style="list-style-type: none"> ● Marshmallow Tower challenge ● design the best paper airplane ● cup and band experiment <ul style="list-style-type: none"> - using only rubber bands to move cups ● Lego WeDo <ul style="list-style-type: none"> -how to use intro | |
| <p>6 weeks Resource: <i>L.1 Cells</i> <i>L.3 Plants</i> <i>L.5 Animals</i> <i>L.1 Food Webs</i></p> | <p>Matter and Energy in Organisms (5-PS3-1, 5-LS1-1)</p> <ul style="list-style-type: none"> -Cells and structures -Function of cells in plants and animals -Systems in plants focusing on how they use air and water -Systems in animals, how they use energy and food -All energy we use to live was once energy from the sun. -Energy flow in ecosystems | <ul style="list-style-type: none"> ● Microscopes and slides ● celery stalks- using dye to track photosynthesis ● carrots- identify parts of a root ● muscles and bones building with straws and clay | <ul style="list-style-type: none"> ● 3-D Cell ● Photosynthesis Diagram ● Human Body Systems Project- Describe how the systems of the human body work* ● Creating a food web* |
| <p>3 weeks Resource: <i>L.1 Cycles</i> <i>L.3 Biomes</i> <i>L.4 Water Ecosystems</i></p> | <p>Earth’s Systems (5-ESS2-1)</p> <ul style="list-style-type: none"> -Different ecosystems/biomes (This is the biosphere) -What is the hydrosphere (water) and how does it affect life? -Different cycles in ecosystems and how they affect biospheres. -How do plants and animals interact with each other and the environment? | <p>-Biome Models*</p> | <p>-Lego WeDo - Raindrop Writing- Pretend you are a raindrop. Describe your journey through the water cycle. -Cycle diagrams -Group Biome reports- combine with models to describe biome</p> |

Trimester 2

| Dates/Resource | Standard and focus | Experiments | Projects |
|---|--|---|---|
| <p>12 weeks <i>L.1-5 using the outline provided (Rock Cycle)</i> <i>L.1-Simple Overview</i> <i>L.2-Simple Overview</i> <i>L.3-4 types of volcanoes only</i> <i>L.4 & L.5-All)</i> <i>L.1</i> <i>-Atmosphere Activity</i> <i>L.2</i> <i>L.3 All storms</i></p> | <p><i>Earth's Systems (5-ESS2-1)</i> - What is the geosphere (land formation), how is land made and changed, and how is it affected by weathering? - What is the atmosphere (air/weather) and how does it affect cloud formation and weather? - How do all the spheres interact and affect each other?</p> | <ul style="list-style-type: none"> ● Oreo Plate Tectonics ● volcanoes- make models of different types of volcanoes/mountains* ● landforms/ mapping the floor (mold ocean floor, cover it, guess-located in textbook) ● Build earth's layers model ● Make Pangea Models ● Lego WeDo ^Drop and Rescue (Weather) | <p>-Students create a presentation over the Earth's geosphere.</p> <p>-Students Jigsaw and create own experiments</p> <p>-Create a diagram/model that shows how all of the spheres of earth interact.</p> |

Trimester 3

| Dates/Resource | Standard and focus | Experiments | Projects |
|---|---|---|--|
| <p>4 weeks <i>Resources:</i> L.2 Soil L.3 Fossil Fuels L.4 Air/Water ***Water pages Matrices created in Science Binder</p> | <p><i>Earth's Systems (5-ESS2-, 5-ESS3-1)</i> - What are Earth's water percentages? How do they affect life? - What are some ways to protect Earth and the environment? - Show some specific communities and their efforts.</p> | <p>- Measure water usage at home -Lego WeDo ^Prevent Flooding (water/erosion) ^Sort to Recycle (Recycling)</p> | <p>- Create a 3-D model of an energy efficient house - Research different percentages of water on earth. Describe how that could affect life*</p> |
| <p>9 weeks <i>Resources:</i> L.1&2 L.1&2 Use Mixtures and Solutions kit to do experiments.</p> | <p><i>Structural Properties of Matter (5-PS1-1, 5-PS1-2, 5-PS1-3, 5-PS1-4)</i> -What are particles? What is matter made of? Focus on elements, protons, neutrons, etc. -How does matter change? When it changes does it lose substance? -When you mix chemicals do you make a mixture, a solution, or have a chemical reaction? -Conduct experiments to determine the results.</p> | <p>-Mixtures and Solutions kit from Foss*</p> | <p>- Create an atom from marshmallows and toothpicks for protons, neutrons, electrons - Periodic Table projects</p> |

Montana's Next Generation Science Standards (by Strand):

Structure and Properties of Matter:

- 5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.** Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.
- 5-PS1-2. 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 matter is conserved.** Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.
- 5-PS1-3. Make observations and measurements to identify materials based on their properties.** Clarification Statement: 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.
- 5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.**

Matter and Energy in Organisms and Ecosystems:

- 5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun.** Clarification Statement: Examples of models could include diagrams, and flow charts.
- 5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.** Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.
- 5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.** Clarification Statement: 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.

Earth's Systems

- 5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.** Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather 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.
- 5-ESS2-2. Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.**
- 5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.**

Space Systems: Stars and the Solar System:

- 5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down.** Clarification Statement: "Down" is a local description of the direction that points toward the center of the spherical Earth.
- 5-ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.**
- 5-ESS1-2. 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.** Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.

Engineering and Design:

- 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.**
- 3-5-ETS1-2. 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.**
- 3-5-ETS1-3. 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.**

RESOURCES

- Foss Kits (Mixtures and Solutions)
- Science- A Closer Look by Macmillan/McGraw-Hill
- Discovery Education
- Google Earth
- Maker Tools: Lego WeDo 2.0, Ozobot, Microbit, Strawbees
- Blackfeet Skies