

COURSE INFORMATION

Grade Level: 4

Length: Full Year

ESSENTIAL UNDERSTANDING

In 4th grade, students will be exposed to many topics. Students will be exposed to 4 different science strands: earth science, physical science, life science and engineering and design. Overall, they should be able to read and understand fourth 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. Students will take notes, categorize information, design and conduct investigations and/or experiments to be utilized.
3. Use and analyze texts, experiments, investigations, and visual sources in order to increase understanding.
4. 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.
5. Demonstrate evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
6. Incorporating math standards with knowing relative sizes of measurement units, and reason abstractly and quantitatively.
7. Conduct short research projects that build knowledge.
8. Make observations and/or measurements to provide evidence of the effects of weathering or the rate or erosion by water, ice, wind, or vegetation.
9. Analyze and interpret data from maps to describe patterns of Earth's features.
10. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
11. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
12. Develop a model of waves to describe patterns in terms of amplitude and wavelength such as light reflecting from objects and compare multiple solutions that use patterns to transfer information.
13. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents and explain how it may relate to the speed of an object.
14. Design, test, and refine a device that converts energy from one form to another such as circuit boards.
15. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

16. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
17. 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.

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 through research-based projects.
3. I can compare multiple possible solutions to solve a problem.
4. I can look at patterns in rock formations and fossils and explain the changes in landscapes over time.
5. I can use measurement units to understand how small and large earth forms are.
6. I can observe and provide evidence on the effects of weathering and erosion.
7. I can design a map that describes patterns of earth's features.
8. I can describe the difference between renewable and nonrenewable resources.
9. I can create a conservation plan to reduce, reuse and recycle.
10. I can develop a model to show patterns of waves and wavelengths and how they transfer information.
11. I can observe that energy can transfer by sound, light, heat, and electric currents and how it relates to speed.
12. I can design a circuit board to model energy conversion.
13. I can provide evidence that plants and animals have internal and external structures that are used to support survival, growth, behavior, and reproduction.
14. I can demonstrate and describe that animals receive information through their senses.
15. I can design a science experiment to prove a hypothesis.

Pacing Guide and Timeline with Standard Included:

*=Required

Trimester 1

Dates/Resource	Standard and Focus	Experiments	Projects
(4 Weeks) Earth Science (Chapter 5) Ngss.nsta.org	Earth's Place in the Universe (4-ESS1-1, 4-ESS1.C)	Volcano with plastic water bottles	Construct a model of a feature on Earth's surface
When done teaching all information,	What are Earth's features above and below ground?	Volcano Viscosity (igneous rock formation)	Pangea Project (Continental Drift Theory and Plate Tectonics)*

Dates/Resource	Standard and Focus	Experiments	Projects
STEM activities.	<p>How can Earth's crust change?</p> <p>What forces shape and change Earth's landforms?</p> <p>How does weather shape and change the land?</p>	<p>Eroded rock grains (discover what size of material will be moved)</p> <p>Super-Cool Experiment (discover what happens to freezing and thawing rocks)</p>	
<p>(4 Weeks) Weather and Climate (Chapter 7) ngss.nsta.org</p> <p>When done teaching all information, STEM activities.</p>	<p>Earth's Systems (4-ESS2-1, 4ESS2-2, 4-ESS2.A, 4-ESS2.B, 4-ESS2.E)</p> <p>How can you tell that air is around you?</p> <p>How is water recycled?</p> <p>How do fronts and air masses change the weather?</p> <p>Why do weather patterns change?</p>	<p>Water cycle experiment (make a cloud in a jar)*</p> <p>Evaporation rate between different colored cups</p> <p>Make a model (How does a size of a puddle effect how fast it evaporates)</p>	<p>How does wind move? (p. 313)</p> <p>Weather journal</p> <p>Cloud poster using cotton balls</p> <p>Climb It (learn about a famous mountain range along with its altitude and climate change)</p> <p>Global Warming Expository Text</p>
<p>(4 Weeks) Earth's Resources (Chapter 6)</p> <p>(See Social Studies Chapter 1 for 4-ESS3-1 This standard is found in all social studies unites about regions)</p> <p>ngss.nsta.org</p>	<p>Earth's Systems (4-ESS2-1, 4-ESS2-2, 4-ESS2.A, 4-ESS2.B, 4-ESS2.E, 4-ESS3-1)</p> <p>Why are there so many different kinds of rock?</p> <p>How does soil differ from place to place?</p> <p>What are fossils and fossil fuels?</p> <p>How do people use and obtain water?</p>	<p>Soil Permeability*</p> <p>STEM Irrigation system (use cups, straws, clay, and water)</p> <p>Oil Spill Simulation (Fill a bottle with water, food coloring, and oil. Students must attempt to clean out the oil)</p>	<p>Lego WeDo (Cleaning the ocean) (see Mrs. Hansen)</p> <p>Recycling Centers</p> <p>Edible Soil (make a model fo the layers of soil with chocolate chips, pudding, oreos, and coconut flakes)</p>

Dates/Resource	Standard and Focus	Experiments	Projects
When done teaching all information, STEM activities.	How can people reduce pollution and conserve resources?		

Trimester 2

Dates/Resource	Standard and Focus	Experiments	Projects
(2-3 Weeks) Forces (Chapter 11) ngss.nsta.org	Energy (4-Ps4-1-4) How do objects move? How can pushes and pulls affect the way objects move? How are energy and work related? How do simple machines make work easier?	Inertia (explain Newton's first law when an egg drops into a glass) Make a ramp (How do forces change motion?)* Magnets and motion Cooking energy (use renewable energy from the sun to cook s'mores)	Inertia Towers Why do basketballs bounce and why do eggs not? Expository Text Potential and Kinetic Energy Newton's Law Poster/Notes (learn about Newton's 3 laws)
(2-3 Weeks) Energy (Chapter 12) ngss.nsta.org	Energy (4-Ps4-1,2,3,4) What is heat? How can you make sounds? How does light behave? How does electricity affect your life?	What keeps heat out? What makes white light? How does a magnifying glass bend light? Pinhole cameras and eyes (see inverted objects with magnifying lens)* The Sound of Science (make a model ear) Salt and Pepper electricity (separate salt and pepper with static electricity) Circuit Boards	Infer which materials are the best insulators. The sound of science (build stringed instruments with three pitches) The effects of gravity short page story of how life on Earth would change if gravity were half of what it is now

Trimester 2-3

Dates/Resource	Standard and Focus	Experiments	Projects
<p>(2-3 Weeks) The Human Body (Body Books)</p> <p>ngss.nsta.org</p>	<p>From Molecules to Organisms: Structure and Processes (4-LS1-1)</p> <p>How does exercise affect the body?</p> <p>How are hands able to grasp things?</p> <p>Helping bones heal</p> <p>How much air do you breathe?</p> <p>How does food move to your stomach?</p> <p>How do colors affect what you what you see?</p>	<p>STEM Why are bones important?</p> <p>Straws/pencil/clay*</p>	<p>Model lung</p> <p>Human ear model (demonstrate how sound waves travel through the ear and vibrate the ear drums)</p> <p>KWL skeleton chart</p> <p>Diagram of human systems*</p> <p>Human body interactive notebook</p> <p>Edible blood vessel (plasma, blood cells, white blood cells, platelets)</p> <p>The common cold expository text</p>
<p>(2-3 Weeks) Exploring Ecosystems (Chapter 3)</p> <p>ngss.nsta.org</p>	<p>From Molecules to Organisms: Structure and Processes (4-LS1-1)</p> <p>How do animals compare?</p> <p>Which animals have backbones?</p> <p>How do systems help animals survive?</p> <p>How do animals grow and reproduce?</p>	<p>How does a snail respond?</p> <p>How do teeth help animals eat? (Animals teeth shapes)</p> <p>Feeding frenzy activity (insect adaptation on how they eat)</p> <p>What does a backbone do? (Which can support more weight using modeling clay and a pencil)</p>	<p>Photosynthesis posters*</p> <p>Classifying aliens (group aliens into different kingdoms, phylums, ect. Based on their different characteristics)</p> <p>Vertebrate/invertebrate Venn diagrams*</p> <p>Nutrition label activities</p> <p>Classifying animals by their symmetry</p>

Dates/Resource	Standard and Focus	Experiments	Projects
			All rise: What is yeast? Expository text
(2-3 Weeks) Exploring Ecosystems (Chapter 3) ngss.nsta.org	From Molecules to Organisms: Structures and Processes (4-LS1-1,2) How do the parts of an ecosystem interact? How do ecosystems compare? How do organisms get energy?	Growing plants with changing variables (how does temperature affect seed growth?)* How are soils different? Land snail habitat	What can you find in an environment? (What living and nonliving things might you find in your environment?)
(2-3 Weeks) Surviving in Ecosystems (Chapter 4) ngss.nsta.org	From Molecules to Organisms: Structures and Processes (4-LS1-1,2) How do animals survive in their environments? How do plants survive in their environments? How can changes in an environment effect the animals that live there?	Pop bottle ecosystem	Butterfly kits (see the cycle of a butterfly) Endangered Animal: Do Your Part! Mimicry game How do environmental changes affect a food chain in an ecosystem? (In what way does a change in the environment affect all organisms in a food chain?)* How much energy is needed to feed different organisms
(2-3 Weeks)	Engineering and Design Explain the scientific method and how to apply	(See above experiments) Skittles experiment (use the scientific method to decide if skittles will dissolve faster in hot or cold water)*	(See above projects)

Dates/Resource	Standard and Focus	Experiments	Projects
	Conduct experiments/increase interest in science Change variables		

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

Energy

- develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move (1) see Science vs. Music
- develop a model communicating that light reflected from objects into the eye allows objects to be seen (2)
- generate and compare multiple solutions that use patterns to transfer information (3)

Life Science

- construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction (1)
- use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways (2)

Earth Science

- identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time
- make observations or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation (1)
- analyze and interpret data from maps as evidence to make a claim about patterns of Earth's features (2)
- obtain and combine information from a variety of sources to communicate that energy and fuels are derived from natural resources and their uses affect the environment (1)
- generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans (2)

RESOURCES

- Foss Kits
- Science: A Closer Look by Macmillan/McGraw-Hill
- Google Earth
- Maker Tools: Lego WeDo 2.0 Ozobo, Microbit, Strawbees
- Read and Understand Science by Evan-Moor Grades 3-4

- Read and Understand Science by Evan-Moor Grades 4-6
- Electrical Connections: AIMS Activities for Grades 4-9