

**Big Idea: The Solar System & Beyond (Module 6) & Interactions of Earth's Major Systems (Module 5)****Inquiry Questions****Science:**

- How do the Sun, Earth, and the Moon interact? (Mod 6, L 1)
- What causes the repeating pattern of the Moon's appearance? (Mod 6, L 2)
- What other objects can be found in space? (Mod 6, L 3)
- What are stars, and why are some brighter than others? (Mod 6, L 4)
- How do scientists define Earth's systems? (Mod 5 –Lesson 1)
- How does the geosphere affect other systems? (Mod 5 –Lesson 2)
- How does the hydrosphere affect other systems? (Mod 5 –Lesson 3)
- How does the atmosphere affect other systems? (Mod 5–Lesson 4)
- How does the biosphere affect other systems? (Mod 5 –Lesson 5)

**Technology:**

- How do telescopes help us to study the stars?

**Engineering:**

- How can you use the sun, moon, and/or stars to create a timepiece and compass?

**Mathematics:**

- How does the position on Earth affect temperatures?

**Social Studies:**

- How did early explorers use the sun, moon, and stars for travel and time?
- What did early cultures believe about the sun, moon, and stars? How were early religions formed or affected by the sun, moon, and stars?

**Content Area    Grade Level Standards****Science**

**5.ESS.1** Analyze the scale of our solar system and its components: our solar system includes the sun, moon, seven other planets and their moons, and many other objects like asteroids and comets. (Module 6 – Lesson 3 & 4) {Leveled Reader The Galileo Mission to Jupiter & The Sun and Other Stars} { Science Handbook p. 220-229, p. 239, p. 236-237 & 246-247}

**5.ESS.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. (Module 6 – Lesson 1, 2 & 4) {Leveled Reader – The Sun & Other Stars} {Science Handbook – p. 230-235 & p. 244-245}

**5.ESS.3:** Investigate ways individual communities within the United States protect the Earth's resources and environment. (Module 5 – Lessons 3 & 5) {Leveled Reader – Ecosystems & The Water Cycle} {Science Handbook – 130-135}

**5.ESS.4:** Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. (Module 5 – Lessons 1 – 5) {Leveled Readers – The Water Cycle} {Science Handbook – p. 186-189, p. 138-139, p. 98-100}

## STEM Integrated Concepts: Earth and Space Science | 5th Grade

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<b>Technology</b>	<p>1.C Things that are found in nature differ from things that are human-made in how they are produced and used.</p> <p>1.E Creative thinking and economic and cultural influences shape technological development.</p> <p>2.K Tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing.</p> <p>6.B Because people's needs and wants change, new technologies are developed, and old ones are improved to meet those changes.</p> <p>6.C Individual, family, community, and economic concerns may expand or limit the development of technologies.</p>
<b>Engineering</b>	<p>1.D Tools, materials, and skills are used to make things and carry out tasks.</p> <p>6.B Because people's needs and wants change, new technologies are developed, and old ones are improved to meet those changes.</p> <p>2.H Resources are the things needed to get a job done, such as tools and machines, materials, information, energy, people, capital, and time.</p> <p>2.I Tools are used to design, make, use, and assess technology.</p> <p>9.C The engineering design process involves defining a problem, generating ideas, selecting a solution, testing the solution(s), making the item, evaluating it, and presenting the results.</p> <p>9.D When designing an object, it is important to be creative and consider all ideas.</p> <p>9.E Models are used to communicate and test design ideas and processes.</p>
<b>Mathematics</b>	<p>5.NBT.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and <math>\frac{1}{10}</math> of what it represents in the place to its left.</p> <p>5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.</p> <p>5.NBT.35.NBT.3. Read, write, and compare decimals to thousandths.</p> <p>5.NBT.4 Use place value understanding to round decimals to any place.</p> <p>5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.</p> <p>5.MD.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.</p> <p>5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).</p> <p>5.G.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.</p>
<b>Social Studies</b>	<p>5.1.2 Ways of Life Before and After the Arrival of Europeans to 1610. Examine accounts of early European explorations of North America including major land and water routes, reasons for exploration and the impact the exploration had.</p> <p>5.3.1 The World in Spatial Terms: Demonstrate that lines of latitude and longitude are measured in degrees of a circle, that places can be</p>

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precisely located where these lines intersect, and that location can be stated in terms of degrees north or south of the equator and east or west of the prime meridian.

5.3.2 The World in Spatial Terms: Identify regions of the United States and explain the advantages and disadvantages of using maps, globes and photographs to locate and describe these regions.

**ELA****Reading: Informational Text**

CCSS.ELA-Literacy.RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-Literacy.RI.4.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.

CCSS.ELA-Literacy.RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

CCSS.ELA-Literacy.RI.4.4 Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*.

CCSS.ELA-Literacy.RI.4.5 Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.

CCSS.ELA-Literacy.RI.4.6 Compare and contrast a firsthand and secondhand account of the same event or topic; describe the differences in focus and the information provided.

CCSS.ELA-Literacy.RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

CCSS.ELA-Literacy.RI.4.8 Explain how an author uses reasons and evidence to support particular points in a text.

CCSS.ELA-Literacy.RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

CCSS.ELA-Literacy.RI.4.10 By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4–5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

**WRITING**

CCSS.ELA-Literacy.W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

- W.4.2a Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.
- W.4.2b Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
- W.4.2c Link ideas within categories of information using words and phrases (e.g., *another, for example, also, because*).
- W.4.2d Use precise language and domain-specific vocabulary to inform about or explain the topic.
- W.4.2e Provide a concluding statement or section related to the information or explanation presented.

CCSS.ELA-Literacy.W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.

CCSS.ELA-Literacy.W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

CCSS.ELA-Literacy.W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

CCSS.ELA-Literacy.W.4.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences

### Science Process Standards

#### Science Process Standards

##### Nature of Science

- ☒ Make predictions and formulate testable questions.
- ☒ Design a fair test.
- ☒ Plan and carry out investigations—often over a period of several lessons—as a class, in small groups or independently.
- ☒ Perform investigations using appropriate tools and technologies that will extend the senses.
- ☒ Use measurement skills and apply appropriate units when collecting data.
- ☐ Test predictions with multiple trials.
- ☒ Keep accurate records in a notebook during investigations and communicate findings to others using graphs, charts, maps and models through oral and written reports.
- ☒ Identify simple patterns in data and propose explanations to account for the patterns.
- ☒ Compare the results of an investigation with the prediction.

##### Design Process

- ☒ Identify a need or problem to be solved.
  - ☒ Brainstorm potential solutions.
  - ☒ Document the design throughout the entire design process.
  - ☐ Select a solution to the need or problem.
  - ☒ Select the most appropriate materials to develop a solution that will meet the need.
  - ☐ Create the solution through a prototype.
  - ☐ Test and evaluate how well the solution meets the goal.
  - ☒ Evaluate and test the design using measurement.
  - ☒ Present evidence by using mathematical representations (e.g., graphs, data tables).
- Communicate the solution (including evidence) using mathematical representations ☐  
(graphs, data tables), drawings or prototypes.
- ☒ Communicate how to improve the solution.

### Standards for Mathematical Practice

#### Mathematical Practices

- ☒ MP.1. Make sense of problems and persevere in solving them.
- ☒ MP.2. Reason abstractly and quantitatively.
- ☒ MP.3. Construct viable arguments and critique the reasoning of others.
- ☒ MP.4. Model with mathematics.
- ☒ MP.5. Use appropriate tools strategically.
- ☒ MP.6. Attend to precision.
- ☒ MP.7. Look for and make use of structure.
- ☒ MP.8. Look for and express regularity in repeated reasoning.

# STEM Integrated Concepts: Earth and Space Science | 5th Grade

## Plan of Work

### Common Misconceptions

The sun moves across the sky.  
 During the summer the sun is closer to the Earth.  
 The amount of sunlight during the day affects the temperature of a location.  
 The Earth is closer to the sun in the summer.  
 Lengths of shadows do not change.

### Suggested Activities

- Students will analyze and record data about the length of shadows, the time of day and the position of the sun. (Mod 6 – Lesson 1)
- Students will test to see if the size of a crater is affected by the size of an object. (Mod 6 – Lesson 2)
- Students will investigate whether the distance of stars determine their apparent brightness. (Mod 6 – Lesson 4)
- Students will create a 3-d model the ocean floor and then compare it to another group's model. (Mod 5 – Lesson 1)
- Students will model how tectonic plates interact with one another and how this affects structures and landforms on earth's surface. (Mod 5 – Lesson 2)
- Students will explore the effects of warm and cold water meeting and will make connections of what occurs in the atmosphere. (Mod 5 – Lesson 4)
- Students will learn about how humans can affect the geosphere by mining for useful minerals and resources. (Mod 5 – Lesson 5)

### Suggested Vocabulary

#### Mod 6 – Lesson 1

Orbit  
 Gravity  
 Inertia  
 Revolution  
 Rotation

#### Mod 6 – Lesson 2

Satellite  
 Phase  
 Tide  
 Solar eclipse  
 Lunar eclipse

#### Mod 6 – Lesson 3

Asteroid  
 Meteor  
 comet

#### Mod 6 – Lesson 4

Star  
 Light-year  
 Constellation  
 Nebula  
 White dwarf  
 Supernova  
 Black hole

#### Mod 5 – Lesson 1

Atmosphere  
 Hydrosphere  
 Biosphere  
 geosphere

#### Mod 5 - Lesson 2

Crust  
 Mantle  
 Core  
 Continental drift  
 Tectonic plates  
 fault

#### Mod 5 – Lesson 3

Groundwater  
 Aquifer , estuary  
 Erosion  
 Deposition  
 desalination

#### Mod 6 – Lesson 4

Evaporation  
 Condensation  
 Perspiration  
 Climate  
 Front

#### Mod 6 – Lesson 5

Nonrenewable resources  
 Renewable resources  
 Pollution  
 conservation

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<u>Plan of Work</u>	
Resources	Reading the novel Hatchet series by Gary Paulson Visiting the Challenge Center in Brownsburg <a href="http://www.mathisfun.com/earth-orbit.html">www.mathisfun.com/earth-orbit.html</a>
Assessment	
Type of Assessment	Example
<input type="checkbox"/> Observation	
<input type="checkbox"/> Oral Questioning	
<input checked="" type="checkbox"/> Exit Slip	Students explain what they know about sun, moon, and stars
<input checked="" type="checkbox"/> Journal	Daily moon journals recording the phases of the moon
<input type="checkbox"/> Graphic Organizers	
<input type="checkbox"/> Self-Assessment	
<input checked="" type="checkbox"/> Writing Prompt	Origin Story
<input checked="" type="checkbox"/> Presentation	Compare temperature graphs with classmates
<input type="checkbox"/> Electronic media	
<input type="checkbox"/> Think Pair Share	
<input type="checkbox"/> Whiteboards	
<input checked="" type="checkbox"/> Experiment/projects	Students demonstrate and explain their compasses and timepieces
<input type="checkbox"/> Quiz	
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	