

Sun Misconceptions

Student Objectives

The student:

- understands why some common phrases about the Sun are incorrect
- can describe how the Earth's rotation affects how we perceive the Sun's path and the length of shadows.

Key Words:

rotation

Time:

1 class period

Materials:

- Science Journal

Background Information – Answer Key

1. *Incorrect Statement* - The Sun moves across the sky from east to west.
Answer: The Sun appears to move across our sky from the east to west because of the Earth's counterclockwise rotation.
2. *Incorrect Statement* - The Sun comes up in the east and goes down in the west.
Answer: This apparent motion is also due to our counterclockwise rotation. As our Earth turns and the part of the Earth we are on rotates towards the Sun, we see it appear to rise above the horizon.
3. *Incorrect Statement* - The Sun moved behind a cloud.
Answer: The clouds move across the sky, moving between where we are on the Earth and the Sun.
4. *Incorrect Statement* - The Sun isn't out on stormy days.
Answer: The Sun is still in the sky in the same place, the clouds are just so thick that its light doesn't get through them.
5. *Incorrect Statement* - A shadow changes as the Sun moves.
Answer: The length of the shadow does change (getting shorter when the Sun is more overhead), however, it's our Earth turning that causes the apparent change in position of the Sun, not the Sun moving.
6. *Incorrect Statement* - The Sun stays up in the sky longer in the summer than in the winter.
Answer: The amount of daylight hours is longer in the summer than the winter. This is caused by the tilt of our Earth.
7. *Incorrect Statement* - When the Sun goes down, the Moon comes up.
Answer: The Moon's and the Sun's orbit are independent of each other. The Moon is sometimes in the part of the sky that is visible to us during the day; however, when the sunlight is bright it is not visible.
8. *Incorrect Statement* - Humans could survive without the Sun if we grew our plants under lights.

Answer: The Earth would be too cold for life as we know it to survive. In addition, even if we could figure out a way to live indoors in a climate controlled environment, the only source of energy we would have after the fossil fuels were used up would be nuclear.

9. *Incorrect Statement* - The Sun radiates less heat in the winter than in the summer.

Answer: The Sun radiates the same amount of energy every day. However, because of the tilt of the Earth on its axis, the sunlight shines more directly on the Earth in the summer.

10. *Incorrect Statement* - Our Sun is different than the other stars in the universe.

Answer: Our Sun is basically the same as the other stars in the universe, only closer to us.

Procedure

1. Divide students into groups of 3 - 4 students per group.
2. Explain to the students that they will be brainstorming within their groups the reasons that the statements in their Science Journal are incorrect, and then they will be sharing their answers with the class. The students should each write down in their Science Journal what they felt was the 'best answer' that their group came up with for each of the statements.
3. After the groups have had time to write down their answers, lead a classroom discussion of their answers. Encourage student groups to use props and models to act out answers when appropriate.

Key Words and Definitions

- **rotation** – the act of spinning on an axis

Further Research

1. Have groups of students act out the correct answers to questions #1 - 4, playing the parts of the Sun, Earth, clouds, etc. Demonstrate to the class with props, the correct answers to questions #5 - 7.
2. Have students investigate the phases of the moon and demonstrate with balls and a flashlight why they appear.

Related Reading

- ***Sun: Jump Into Science*** by Steve M. Tomecek (National Geographic Society, 2001)
This book follows two kids and a purple cat as they learn about sunspots and solar flares, see how the Sun creates night and day and the seasons, and learn how the Sun warms the Earth. It shows the Earth's place in the solar system, scientists studying the Sun through special telescopes, and the bounty of life on Earth nurtured by the heat-giving rays of our star.
- ***The Sun*** by Seymour Simon (HarperTrophy, 1989)
The Sun discusses the sun as a star; its distance from earth, size, and temperature; the solar system; the sun's hydrogen-fueled nuclear power; the parts of the sun and its

- atmosphere; eclipses, sunspots, prominences, flares, and the aurorae.
- ***The Sun (Eye on the Universe, 5)*** by Niki Walker and Bonna Rouse (Crabtree Publishing Company, 2000)
This book explains what type of star the Sun is, what fuels its enormous energy, and what the Sun's position is in our galaxy and how that affects our seasons.

Internet Sites

<http://solar-center.Stanford.EDU/FAQ/>

Frequently asked questions about the Sun – physics, astronomy, history and links to other Sun FAQ sites.

<https://www.youtube.com/watch?v=hMMqbfQvU6w>

Our World: The Sun, A Real Star. NASAeClips, kid-friendly video about the Sun, solar flares, space weather and the relationship between the Sun and Earth's magnetic field.

<http://www.windows2universe.org/mythology/planets/sun.html>

Windows to the Universe. Myths and Legends about the Sun from 18 different cultures, each presented in three reading levels.

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Florida NGSS Standards & Related Subject Common Core

			.1	.2	.3	.4	.5	.6	.7	.8
Grade 3										
The Practice of Science	Big Idea 1	SC.3.N.1	X				X	X		
The Role of Theories	Big Idea 3	SC.3.N.3		X						
Earth in Space and Time	Big Idea 5	SC.3.E.5		X						
Grade 4										
The Practice of Science	Big Idea 1	SC.4.N.1				X				
Earth in Space and Time	Big Idea 5	SC.4.E.5		X	X	X				
Grade 5										
The Practice of Science	Big Idea 1	SC.5.N.1						X		
The Characteristics of Scientific Knowledge	Big Idea 2	SC.5.N.2	X							
Language Arts	Third Grade: LAFS.3.W.3.8, LAFS.3.SL.1.1, LAFS.3.L.3.6 Fourth Grade: LAFS.4.W.3.8, LAFS.4.SL.1.1, LAFS.4.L.3.6 Fifth Grade: LAFS.5.W.3.8, LAFS.SL.1.1, LAFS.5.L.3.6									

Third Grade Benchmarks

Science--Big Idea 1: The Practice of Science

- SC.3.N.1.1 - Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
- SC.3.N.1.5 - Recognize that scientists question, discuss, and check each others' evidence and explanations.
- SC.3.N.1.6 - Infer based on observation.

Science--Big Idea 3: The Role of Theories, Laws, Hypotheses, and Models

- SC.3.N.3.2 - Recognize that scientists use models to help understand and explain how things work.

Science--Big Idea 5: Earth in Space and Time

- SC.3.E.5.2 - Identify the Sun as a star that emits energy; some of it in the form of light.

Language Arts--Writing

- LAFS.3.W.3.8 - Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided

categories.

Language Arts–Standards for Speaking and Listening

- LAFS.3.SL.1.1 - Engage effectively in a range of collaborative discussions with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.

Language Arts–Language Standards

- LAFS.3.SL.3.6 - Acquire and use accurately conversational, general academic, and domain specific words and phrases as found in grade appropriate texts, including those that signal spatial and temporal relationships.

Fourth Grade Benchmarks

Science–Big Idea 1: The Practice of Science

- SC.4.N.1.4 - Attempt reasonable answers to scientific questions and cite evidence in support.

Science–Big Idea 5: Earth in Space and Time

- SC.4.E.5.2 - Describe the changes in the observable shape of the moon over the course of about a month.
- SC.4.E.5.3 - Recognize that Earth revolves around the Sun in a year and rotates on its axis in a 24-hour day.
- SC.4.E.5.4 - Relate that the rotation of Earth and apparent movements of the Sun, Moon, and stars are connected.

Language Arts–Writing

- LAFS.4.W.3.8 - 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.

Language Arts–Standards for Speaking and Listening

- Engage effectively in a range of collaborative discussions with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

Language Arts–Language Standards

- LAFS.4.L.3.6 - Acquire and use accurately general academic and domain specific words and phrases as found in grade level appropriate texts, including those that signal precise actions, emotions, or states of being.

Fifth Grade Benchmarks

Science–Big Idea 1: The Practice of Science

- SC.5.N.1.6 - Recognize and explain the difference between personal opinion/interpretation and verified observation.

Science–Big Idea 2: The Characteristics of Scientific Knowledge

- SC.5.N.2.1 - Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.

Language Arts–Writing

- LAFS.5.W.3.8 - Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

Language Arts–Standards for Speaking and Listening

- LAFS.5.SL.1.1 - Engage effectively in a range of collaborative discussions with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own

clearly.

Language Arts–Language Standards

- LAFS.5.L.3.6 - Acquire and use accurately general academic and domain-specific words and phrases as found in grade level appropriate texts, including those that signal contrast, addition, and other logical relationships.

National Next Generation Science Standards

Fourth Grade

Science--Energy

- 4-PS3-2 - Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

Note: Related Common Core Language Arts Standards are listed in the Florida section above.

Fifth Grade Standards

Science--Earth's Place in the Universe

- 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 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.

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3. The Sun moved behind a cloud.

4. The Sun isn't out on cloudy days.

5. A shadow changes as the Sun moves.

6. The Sun stays up in the sky longer in the summer than in the winter.

7. When the Sun goes down, the moon comes up.

8. Humans could survive without the Sun if they grew their food under lights.

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