Sun Misconceptions

Student Objective
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.
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.

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*** by Lynda Sorensen (Rourke Publishing, 1993)
Sorensen explains what composes the Sun, how the light gets to the Earth, and what the surface of the Sun is like as well solar eclipses, the orbit of our Earth and gravity
- ***Sun*** 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. Kids will be intrigued to learn about eclipses, solar activity, and space weather but, more importantly, they'll gain an insight into the crucial relationship between the Sun and Earth.

- ***The Sun (Starting with Space)*** by Paulette Bourgeois and Bill Slavin (Kids Can Press, 1999)
  This book includes not only basic scientific observations, but also briefly told myths and legends and instructions for easy, homespun demonstrations all illustrated with a combination of color photos and lively cartoons. After a look at the past and future of The Sun, she discusses its visible and invisible emissions, seasons, the ozone layer, and the northern lights, the last accompanied by a particularly spectacular photo taken from space.

Internet Sites

http://www.omsi.edu/explore/whatzit
Oregon Museum of Science and Industry. Science Whatzit answers scientific questions from "what makes electric eels electric?" to "why do leaves change color in the fall?" Site includes interactive component that allows you to ask your own questions**.**

http://solar-center.Stanford.EDU/FAQ/
Frequently asked questions about the Sun – physics, astronomy, history and links to other Sun FAQ sites**.**

http://library.thinkquest.org/15215/
Extensive site about the Sun. Contains links to activities, books, and other information.

http://planetarium.org/
Allentown School District Planetarium. Extensive site includes articles and links to various astronomical subjects, including Sun astronomy, archaeoastronomy, and astronomical misconceptions.

http://www.windows.ucar.edu/tour/link=/mythology/planets/sun.html
Windows to the Universe. Myths and Legends about the Sun from 18 different cultures, each presented in three reading levels.

EnergyWhiz

Submit your solar questions to "Ask Professor Soleil" on the EnergyWhiz web site at **http://energywhiz.com/**. See your class and school name online as well as the answer to your question!

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			.1	.2	.3	.4	.5	.6
Energy	**Standard 1**	**SC.B.1.2-**						
	Standard 2	**SC.B.2.2-**	**X**					
Force and Motion	**Standard 1**	**SC.C.1.2-**	**X**					
	Standard 2	**SC.C.2.2-**						
Earth and Space	**Standard 1**	**SC.E.1.2-**	**X**		**X**			
	Standard 2	**SC.E.2.2-**	**X**					
Nature of Science	**Standard 1**	**SC.H.1.2-**					**X**	
	Standard 2	**SC.H.2.2-**						
	Standard 3	**SC.H.3.2-**						

Benchmark SC.B.2.2.1 - The student knows that some source of energy is needed for organisms to stay alive and grow.
Grade Level Expectations
The student:
Third
- knows that some source of energy is needed for organisms to stay alive and grow.

Benchmark SC.C.1.2.1 - The student understands that types of motion may be described, measured, and predicted.
Grade Level Expectations
The student:
Third
- describes the motion of various objects.

Benchmark SC.E.1.2.1 - The student knows that the tilt of the Earth on its own axis as it rotates and revolves around the Sun causes changes in season, length of day, and energy available.
Grade Level Expectations
The student:
Third
- knows that days and nights change in length throughout the year

Fourth

- knows that the tilt of the Earth causes the change of seasons, length of day, and the amount of energy available.

Benchmark SC.E.1.2.3 - The student knows that the Sun is a star and that its energy can be captured or concentrated to generate heat and light for work on Earth.

Grade Level Expectations

The student:

Third

- knows that the Sun is a star that is much nearer to the Earth than the other stars.

Benchmark SC.E.2.2.1 - The student knows that, in addition to the Sun, there are many other stars that are far away.

Grade Level Expectations

The student:

Third

- knows that, in addition to the Sun, there are many other stars that are far away

Fourth

- understands that the Sun is a medium-sized star located near the edge of a galaxy containing billions of other stars, which in turn is one of innumerable galaxies in the Universe.

Benchmark SC.H.1.2.5 - The student knows that a model of something is different from the real thing but can be used to learn something about the real thing.

Grade Level Expectations

The student:

Third

- uses sketches, diagrams and models to understand scientific ideas.

Fourth

- knows that a model of something is different from the real thing, but can be used to learn something about the real thing.

Sun Misconceptions

rotation - the act of spinning on an axis

Sun Misconceptions

1. The Sun moves across the sky from east to west.

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2. The Sun comes up in the east and goes down in the west.

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3. The Sun moved behind a cloud.

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

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5. A shadow changes as the Sun moves.

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

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

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

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9. The Sun radiates less heat in the winter than the summer.

10. Our Sun is different than the other stars in the universe.