

What’s the Difference?

Strand	Earth Patterns, Cycles, and Change
Topic	Investigating Earth, the moon, and the sun
Primary SOL	4.8 The student will investigate and understand the relationships among Earth, moon, and the sun. Key concepts include a) the motions of Earth, the moon, and the sun; d) the relative size, position, age, and makeup of Earth, the moon, and the sun.
Related SOL	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which b) objects or events are classified and arranged according to characteristics or properties; k) data are communicated with simple graphs, pictures, written statements, and numbers; m) current applications are used to reinforce science concepts.

Background Information

The sun is a yellow average-sized star, about 110 times the diameter of Earth. The sun is made up of mostly hydrogen and helium, and is approximately 4.6 billion years old. Earth is a geologically active planet with a surface that is constantly changing. Unlike Venus, Mercury, and Mars, it has large amounts of water and an oxygen-rich atmosphere. Earth’s moon is about $\frac{1}{4}$ the diameter of Earth, and is a rocky satellite. It has extremes in temperature, virtually no atmosphere, and little water. The surface is covered in a fine gray powder and is riddled with craters. With nothing to erode the surface, the moon’s surface rarely changes in appearance. Earth revolves around the sun about once every 365 days and rotates about once every 24 hours. The moon revolves around Earth once about every 29 days. It takes just as long to rotate once on its axis so the same side of the moon is always facing Earth.

Materials

- Computer
- Reference materials, such as encyclopedias, trade books, or internet sources
- Materials for making a brochure
- Copies of the attached Sun, Moon, and Earth Facts sheet for each student

Vocabulary

Earth, moon, sun, celestial body

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Introduction

1. Tell students that recently the moon has been found to be made mostly out of cheese. Have students debate this statement and ask questions about it and offer evidence or observations. Answer them seriously and try to counter as best as you can.
2. After this discussion, let children know that, of course, the moon is not made of cheese, but ask them how they know any different? Have they been there? Have students come to the realization that although students have not been to the moon, scientists have been. They have provided information about the moon that is listed in reference books for students.
3. Tell students that today they are going to learn about the moon as well as the sun and Earth by reading about each of these celestial bodies and creating a travel brochure for an alien who might think that the moon is made of cheese, Earth is made of earwigs, or the sun is made of silly string.

Procedure

1. Hand out the attached Sun, Moon, and Earth Facts sheet to each student.
2. Assign each student the task of making a travel brochure about one of the celestial bodies: the sun, Earth, or moon. The brochure will advertise the celestial body and convince an alien that it is the best star, planet, or moon to visit in the universe. They should include facts from the resources and the fact sheets provided.
3. Allow student the chance to work on the brochure over a period of time, providing them ample time to look at each resource and fact sheet.

Conclusion

1. Once students complete their brochure, have them meet with two other students who have done the other celestial bodies.
2. Have the small groups come up with a chart of how the three bodies are alike and different, based on the information in their brochures and what they learned from making the brochures.

Assessment

- **Questions**
 - How is the Earth like the moon?
 - What would happen if you wrote your name in the dusty surface of the moon with your finger? How long would it take to disappear?
- **Journal/writing prompts**
 - Explain several reasons why people cannot live on the sun.
 - Do your best to come up with a way to explain how people could live on the moon. What would we need to bring or create on the moon?
 - The fictional superhero Superman was able to leap over buildings in a single bound. How might you be like Superman on the moon?
- **Other**
 - Have students list facts about the sun, moon, and Earth.
 - Have students create a spreadsheet categorizing important aspects of the sun, the moon, and the Earth.

Extensions and Connections (for all students)

- Have students research another star. Students should discuss the relationship of the star to the sun.
- Have students research the moon Titan and compare it to Earth's moon.

Strategies for Differentiation

- The teacher can give pictures of the sun, Earth, and moon for students to use while teaching this lesson.
- Have students orally present their brochure.
- Students may use computers to create the travel brochure.
- Provide leveled texts for students to use for research.
- Allow students to choose a summarization activity using a choice board in lieu of a travel brochure. Product choices could include: write a song, create a one minute commercial, create a PowerPoint presentation, create a picture dictionary, create a mural, create a poster, create a RAFT essay, etc.

Sun, Moon, and Earth Facts

Name: _____ Date: _____

Sun Facts

- The sun is an average-sized yellow star, about 110 times the diameter of the Earth. (The sun is about 1.39 million kilometers in diameter.)
- The sun has 330,000 times the mass of the Earth and is 93 million miles (150 million km) away from the Earth on average.
- Light from the sun takes about eight minutes to reach Earth.
- The sun is composed of very hot gases, mostly hydrogen and helium, with smaller amounts of other gases.
- The temperature of the sun is about 60,000 degrees Celsius on the surface. Its yellow color comes from its surface temperature.
- The sun's temperature at its center is about 15,000,000 degrees Celsius (27,000,000 degrees Fahrenheit). The sun's energy (heat and light) comes from nuclear reactions, which turn hydrogen into helium.
- The sun has been shining for about 5 billion years and is expected to shine for about another 4.5 billion years.
- Our sun is a star that is modest in size and shines with a calm and steady light at this time in its life cycle. Unlike many stars, it does not have a companion or twin.
- All these things help to make it possible for life to exist on Earth.

Earth Facts

- The Earth is 12,756 kilometers (7,927 miles) in diameter.
- The Earth is the third planet from the sun and is about 150 million kilometers (93 million miles) from the sun.
- The sun provides the energy that gives light and heat to the Earth. The Earth is close enough to the sun to be warm, but far enough away so that we don't burn up.
- The Earth has an atmosphere rich in oxygen and nitrogen. The atmosphere helps to support life and protects living creatures from some of the sun's

harmful rays. In fact, Earth is the only planet we know of that has living things on it.

- The Earth has large amounts of life-supporting water. Almost three quarters of the planet's surface is covered by water.
- The Earth has seven large landmasses, called "continents."
- Water occurs naturally in all three phases (ice, water, and water vapor) on Earth.
- Earth revolves around the sun about once every 365 days and rotates about once every 24 hours.

Moon Facts

- The moon is about one-fourth the diameter of the Earth.
- On the surface of the moon, gravity is about one-sixth that of Earth.
- The moon actually rotates exactly once each time it orbits, which means that it keeps the same face toward the Earth all the time. It takes about 29.5 days for the moon to go through all of its phases from one full moon to the next full moon.
- The moon was probably formed very early in our solar system when something the size of a planet collided with Earth. From this collision, the moon was formed.
- The surface of the moon is actually darker than the Earth's surface.
- Of all the sun's light hitting the moon, about 11 percent is reflected.
- The surface of the moon has many large, dark areas, which give the moon its "man in the moon" appearance. These are ancient lava flows, called "maria," which means "seas." Early astronomers thought these dark areas were made of water.
- The moon has many craters caused by collisions from asteroids. Early astronomers originally thought they were caused by volcanoes.
- The Apollo missions to the moon (1969-1972) are thought by some scientists to be the most important science investigation in history.