

Lesson 2: Exploring the Moon

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Lesson Snapshot

Moon Munchies

*Lesson 2
Exploring
the Moon*

Overview

Big Idea: The moon does not provide natural resources that would allow plants to grow, but astronauts can provide an environment to grow plants.

Teacher's Note: Big ideas should be made explicit to students by writing them on the board and/or reading them aloud.

Purpose of Lesson: This lesson introduces students to the characteristics of the moon.

Lesson Duration: Two hours.

Activity Highlights

Engagement: The teacher places lava rocks and “moon dust” (crushed lava rocks) around the room. The students enter a dark room and are asked to “leap” around the room. The students determine where they are for the day. The KWL worksheet is used to obtain some understanding of student knowledge about the moon.

Exploration: The teacher reads a book about the moon. Using their prior and acquired knowledge, students work in small groups to draw pictures of the moon and are asked to write facts. Each group shares their illustrations and facts. The teacher shows students a picture of the moon and Earth. During a discussion led by the teacher, students complete a Venn diagram comparing the moon and Earth. The teacher shows students a packet of seeds. Each student responds to the following on a worksheet: *If we planted seeds on the moon, do you think they would grow? Use information from what we have read to explain your answer.* Students discuss their responses. The teacher asks questions and guides a conversation about what seeds would be best for astronauts to take to the moon to provide food. Students complete a worksheet determining what would need to be in a lunar plant growth chamber.

Explanation: Students verbally identify and describe characteristics of the moon and how the moon and Earth differ. Students verbally explain why plants couldn't grow on the moon; what seeds and plants would be best to grow on the moon; what astronauts would need to take to the moon so that plants could grow and what should be included in a lunar plant growth chamber.

Extension: Students complete a KWL chart, make a model of the moon and complete pages in booklets.

Evaluation: Rubrics guide and assess:

- KWL chart
- Model of the moon
- Natural Environment Booklet (*Natural Resources on Earth 2*)

Lesson 2: Overview

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Lesson Duration

- Two hours.

Standards/Benchmarks

Science: Benchmarks for Science Literacy (AAAS, 1993)

- People, alone or in groups, are always inventing new ways to solve problems and get work done. The tools and ways of doing things that people have invented affect all aspects of life. (AAAS 3C)
- When a group of people wants to build something or try something new, they should try to figure out ahead of time how it might affect other people. (AAAS 3C)
- Eating a variety of healthful foods and getting enough exercise and rest help people to stay healthy. (AAAS 6E)

Mathematics: Principles and Standards for School Mathematics (NCTM, 2000)

- Represent data using concrete objects, pictures and graphs. (NCTM Data Analysis and Probability)

Science: National Science Education Standards (NRC, 1996)

- All students should develop an understanding of objects in the sky.
 - The sun, moon, stars, clouds, birds and airplanes all have properties, locations and movements that can be observed and described.

English Language Arts: Standards for the English Language Arts (NCTE, 1996)

- Students read a wide range of print and non-print texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.
- Students use spoken, written and visual language to accomplish their own purposes. (e.g., for learning, enjoyment, persuasion and the exchange of information).

Learning Objectives

Students will learn to:

1. Identify and describe properties of the moon.
2. Compare and contrast the properties of the moon and Earth.
3. Determine that a growth chamber is needed to grow plants on the moon.

Student Assessment Tools and/or Methods

1. Rubric for KWL Chart

Category	Below Target – 0	At Target – 1	Above Target – 2
Completeness	Some sections are not complete. Many sentences do not have a lot of details. The “L” section offers little information about what student learned.	All sections are complete. A few sentences do not have a lot of details. The “L” section offers some information about what student learned.	All sections are complete with a lot of details. The “L” section offers exceptional information about what student learned.
Teacher Comment			

2. Rubric for Model of the Moon

Category	Below Target – 0	At Target – 1	Above Target – 2
Color	Color is incorrect.	Color is somewhat correct.	Color is correct.
Surface	No surface has been represented. It is smooth.	Surface includes several landforms.	Surface includes all landforms discussed in class.
Teacher Comment			

Resource Materials

Print Materials

1. Branley, F. M. (1987). *The moon seems to change*. New York: HarperCollins Publisher.
2. Carle, E. (1986). *Papa, please get the moon for me*. New York: Scholastic, Inc.
3. Fowler, A. (1994). *When you look up at the moon*. Chicago, Illinois: Children's Press
4. Gibbons, G. (1997). *The moon book*. New York: Holiday House.
5. Lassieur, A. (2000). *A true book: The moon*. New York: Children's Press.
6. McNulty, F. (2005). *If you decide to go to the moon*. New York: Scholastic Press.
7. Rustad, M. E. H. (2002). *The moon*. Minnesota: Pebble Books.
8. Sorensen, L. (1993). *Moon*. Florida: The Rourke Corporation, Inc.
9. Willis, S. (1999). *Whiz kids tell me why the moon changes shape*. New York: Franklin Watts.

Audiovisual Materials

1. Gross, M. & Kriegman, M. (Directors). (1993). *Bill Nye the science guy: Outer space way out there* (Video). Buena Vista Home Video.
2. Schlessinger A. & Mitchell, T. (Executive Producers). (1999). *All about the moon: Space science for children* (Video). Wynnewood, PA: Schlessinger Media.

Internet Sites

1. Canright, S. (Editor) & Dunbar, B. (NASA Official). (March 28, 2007). Kids' main page. Retrieved April 14, 2007 from <http://www.nasa.gov/audience/forkids/home/>
2. Fisher, Diane. (August 25, 2006). *What do we know about our moon?* Retrieved April 14, 2007, from http://spaceplace.nasa.gov/en/kids/phonedrmarc/2002_august.shtml
3. Grayzeck, E. (NASA Official) & William, D. K. (Curator). (October 31, 2006). The moon. Retrieved April 14, 2007 from <http://nssdc.gsfc.nasa.gov/planetary/planets/moon-page.html>
4. Keating, S. (Curator) & Gabrys, B. (NASA Official). (October 7, 2004). *Moon links*. Retrieved April 14, 2007 from <http://learners.gsfc.nasa.gov/challenge/moonlinks.html>
5. Lee, J. (NASA Official) & Varros, G. (Curator). (March 29, 2000). *Our moon*. Retrieved April 14, 2007 from <http://spacekids.hq.nasa.gov/osskids/animate/moon.html>
6. Whitlock, L. (Project Leader) & Newman, P. (NASA Official). *The moon: Earth's satellite*. Retrieved April 14, 2007 from http://starchild.gsfc.nasa.gov/docs/StarChild/solar_system_level2/moon.html

Required Knowledge and Skills

1. Students should be able to identify and describe properties of Earth.
2. Students should know what seeds and plants need in order to grow.
3. Students should understand how to complete a Venn diagram.

Engagement

1. The teacher places lava rocks and small piles of crushed lava rock (“moon dust/soil”) on plastic sheeting around the room and turns the lights out before the students enter the room. The teacher asks students to take “leaps” instead of steps as they move around the room to look at the lava rocks and moon dust/soil. The students are given time to feel the lava rocks and moon dust/soil. The lights are turned out because the sky on the moon is always black. There is no atmosphere on the moon to scatter the Sun’s light and create the blue sky we see on Earth.

The teacher asks the following questions:

- Where do you think we are today?
 - Why?
2. Students complete the first two columns of the Moon KWL Worksheet (*Exploring the Moon 1*). After students complete their columns, they share information. As the students share their information, the teacher writes responses on a piece of chart paper.

Exploration

1. The teacher reads a book about the moon to the students.
2. Place students in groups of two to four. Each group receives a large piece of white paper and large round pattern pieces, if needed.

The Task:

- Students draw a moon and include the various characteristics that were discussed in the book—landforms (craters, hills, mountains, rocks, plains, “seas”), dark spots and natural resources (rocks and soil).
 - Students write facts they learned about the moon on index cards.
 - Students share their drawings and facts.
3. Each student receives the worksheet Venn Diagram (*Exploring the Moon 2*). The teacher shows students a picture of the moon and Earth.

The teacher asks the following questions:

- What is the same about the moon and Earth?
 - How is the moon different from Earth?
 - How is Earth different from the moon?
4. Students fill in their Venn diagram during the discussion.
 5. The teacher shows students various packets of seeds. Include packets of fruits, vegetables and flowering plants. Students complete the worksheet Seeds on the Moon (*Exploring the Moon 3*). The teacher leads a discussion of student responses.

The teacher asks the following questions:

- Why can’t seeds and plants grow on the moon?
- What do we have on Earth that allows seeds/plants to grow?
- If astronauts wanted to grow seeds/plants on the moon, what would they need to take with them? (The teacher lists the responses on chart paper.)

- Which type of seeds/plants would be the most beneficial for astronauts? Why? (The teacher points out the ones that provide food.)
 - What kinds of food seeds/plants would be the best to grow on the moon? Why? (Plants that provide a lot of nutritional value would be the best to grow. Tomatoes provide a lot of Vitamin C. Plants that provide little food and a lot of “debris” would not be the best [e.g., wheat].)
 - Which of these packets of seeds do you think would be most beneficial to astronauts? Why? (The teacher should make sure students are looking at the packets in the room.)
 - If you were to go to the moon, which seeds would you want to plant? Why? (The teacher may graph student responses.)
 - Did you choose your favorite food that you had recorded on the worksheet Food From Plants (*Natural Resources on Earth 5*)? Why or why not?
6. The teacher directs student attention to the chart paper that lists what astronauts should take to the moon to grow seeds/plants.

The teacher asks the following questions:

- Why are these items important?
 - What could astronauts build to give seeds/plants the best environment so they can grow on the moon?
 - What would you call this “building?”
7. Students complete the worksheet Plant Growth Chamber Engineer (*Exploring the Moon 4*). Students share their answers. The teacher lists student answers on chart paper.
8. Students explore new terms and concepts by reading selected books or listening to the teacher read.
9. Students explore new terms and concepts by viewing selected videos.
10. Students explore new terms and concepts by viewing selected Internet sites.

Explanation

1. Students verbally identify and describe characteristics of the moon.
2. Students verbally identify and describe how the moon and Earth differ.
3. Students verbally explain why plants couldn't grow on the moon.
4. Students verbally explain what seeds and plants would be the best to grow on the moon.
5. Students verbally explain what astronauts would need to take to the moon so that plants could grow.
6. Students verbally explain what should be included in a lunar plant growth chamber so that plants can grow.

Extension

1. KWL chart.
2. Students make a model of the moon (i.e., papier machè).
3. Students pages 12 and 13 in *Natural Resources on Earth 2*.
4. Student booklet, Our Moon (*Exploring the Moon 5*).

Evaluation

Rubrics guide and assess:

1. Students complete their KWL chart (*Exploring the Moon 1*).
2. Students make a model of the moon.

3. Students' answers to the questions in the booklet, Natural Environment (*Natural Resources on Earth 2*).

Enrichment

1. Students can write stories about the moon and read to younger children.
2. Students can write a letter to NASA asking for information about the moon and/or asking for someone to be a guest speaker.

Lesson 2: Lesson Preparation

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Teacher Planning

1. Crush lava rocks.
2. Prepare a chart with a bar graph for Exploration 5, Bullet 7.
3. Make copies of the following worksheets:
 - a. Moon KWL Chart (*Exploring the Moon 1*)
 - b. Venn Diagram (*Exploring the Moon 2*)
 - c. Seeds on the Moon (*Exploring the Moon 3*)
 - d. Plant Growth Chamber (*Exploring the Moon 4*)
4. Make copies of the Moon booklet (*Exploring the Moon 5*).
5. Prepare flour and water for the papier machè moons.
6. Cut newspaper pieces.

Tools/Materials/Equipment

- Lava rocks (Can be purchased at a garden center)
- Plastic sheeting (Can be purchased at hardware stores)
- Chart paper
- Large white pieces of construction paper
- Crayons/colored pencils/markers/construction paper
- Index cards
- Moon and Earth pictures
- Variety of seed packets
- Suggestion: NASA has done experiments with the following seeds: lettuce, tomato, bell pepper, spinach, strawberries and dried beans.
- Newspaper
- Flour
- Bowls
- Round balloons (inflated)
- Spoons
- Paints for papier machè moon

Classroom Safety and Conduct

Students are expected to follow normal classroom and school safety rules.

Name _____



KWL

Moon

Know

Want to Know

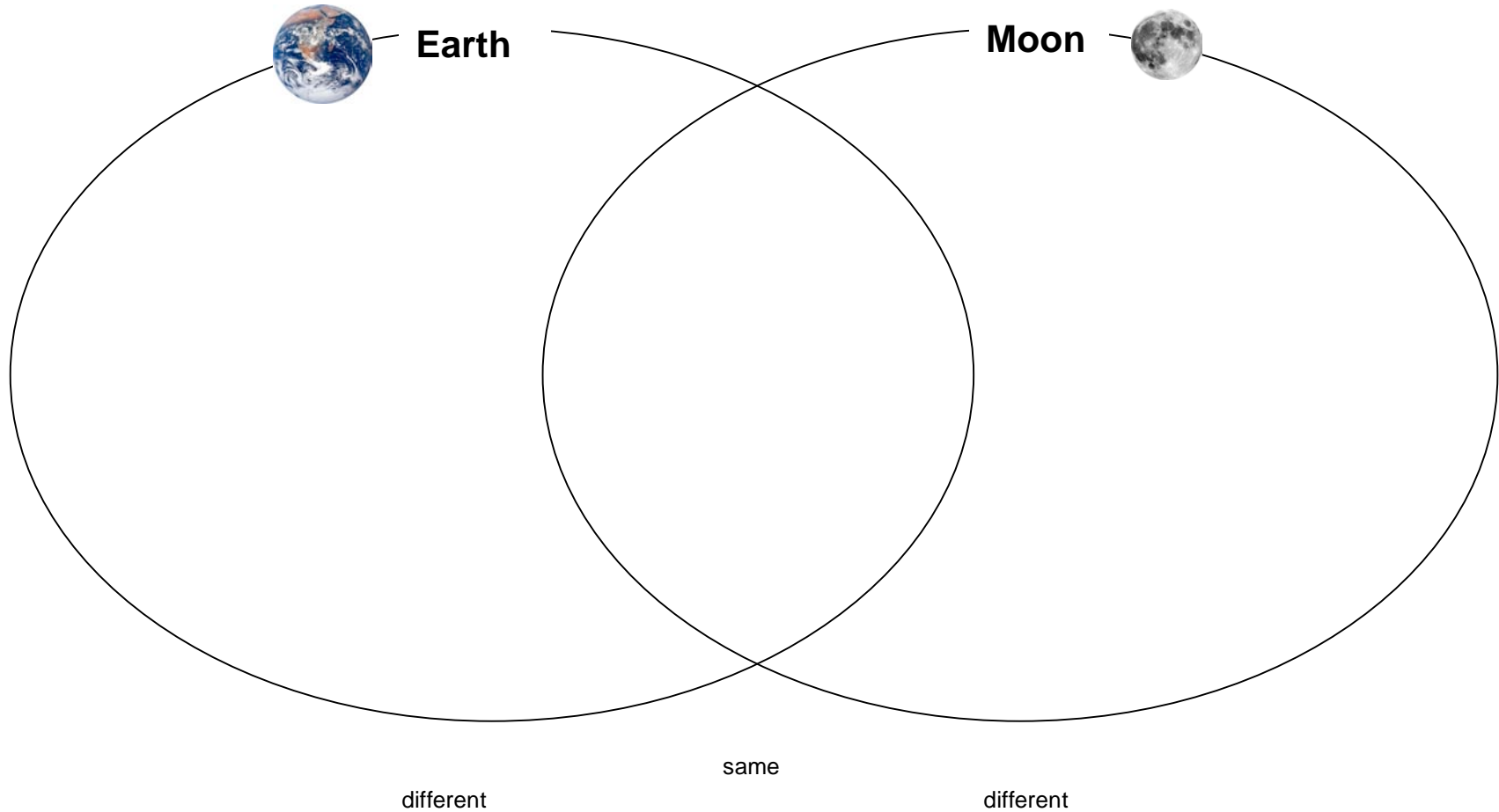
Learned

Write at least two things you know about the moon.	Write at least two things you want to know about the moon.	Write at least two things you learned about the moon.

Name _____

Venn Diagram

Let's compare and contrast the Earth and the moon. List words to describe each one in the correct spaces.

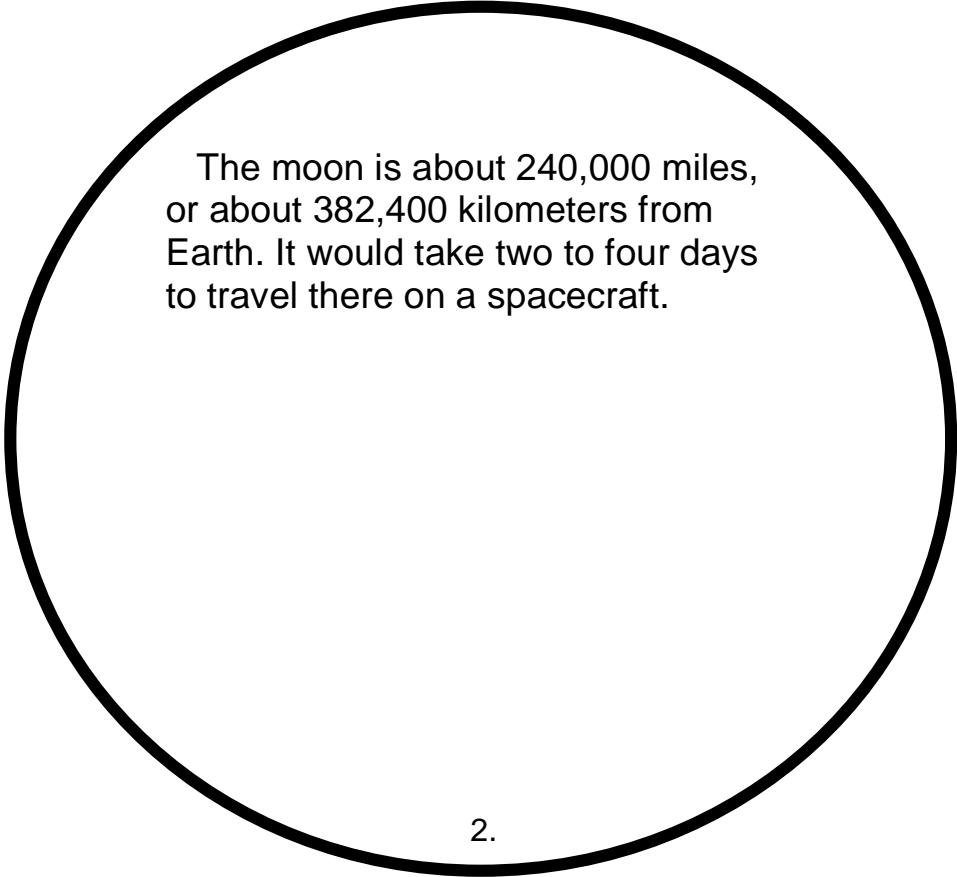


Our Moon

Name _____

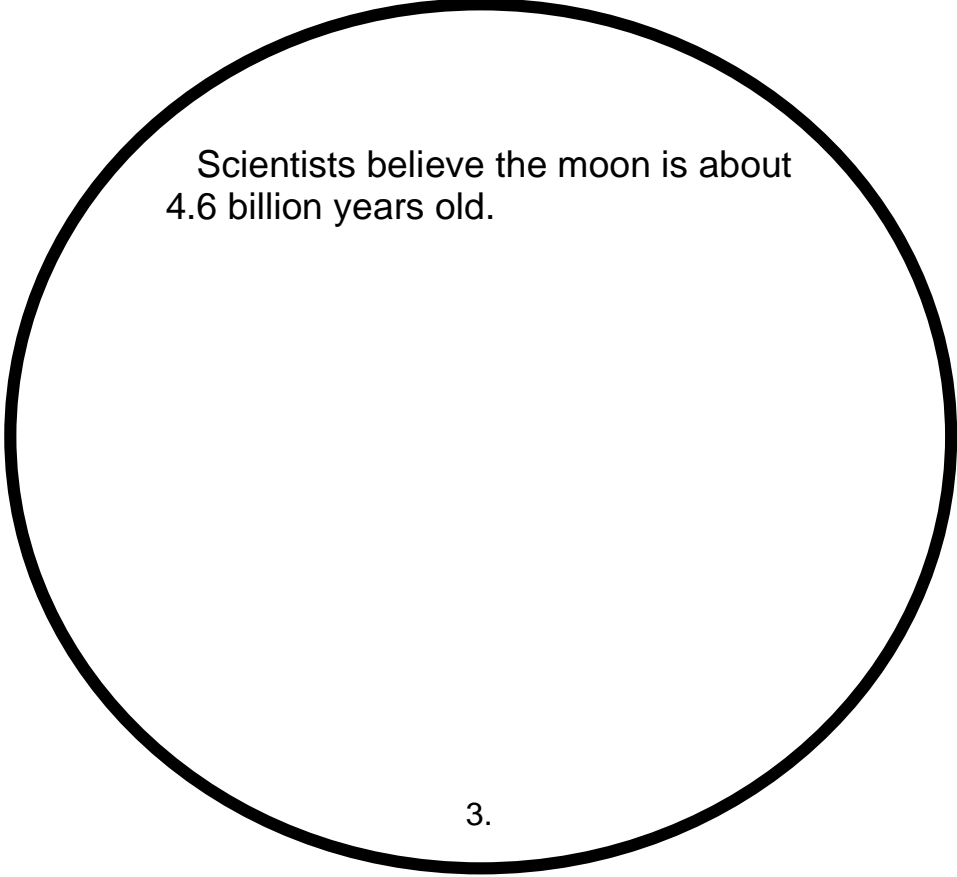
Let's blast off and learn about the moon!

1.



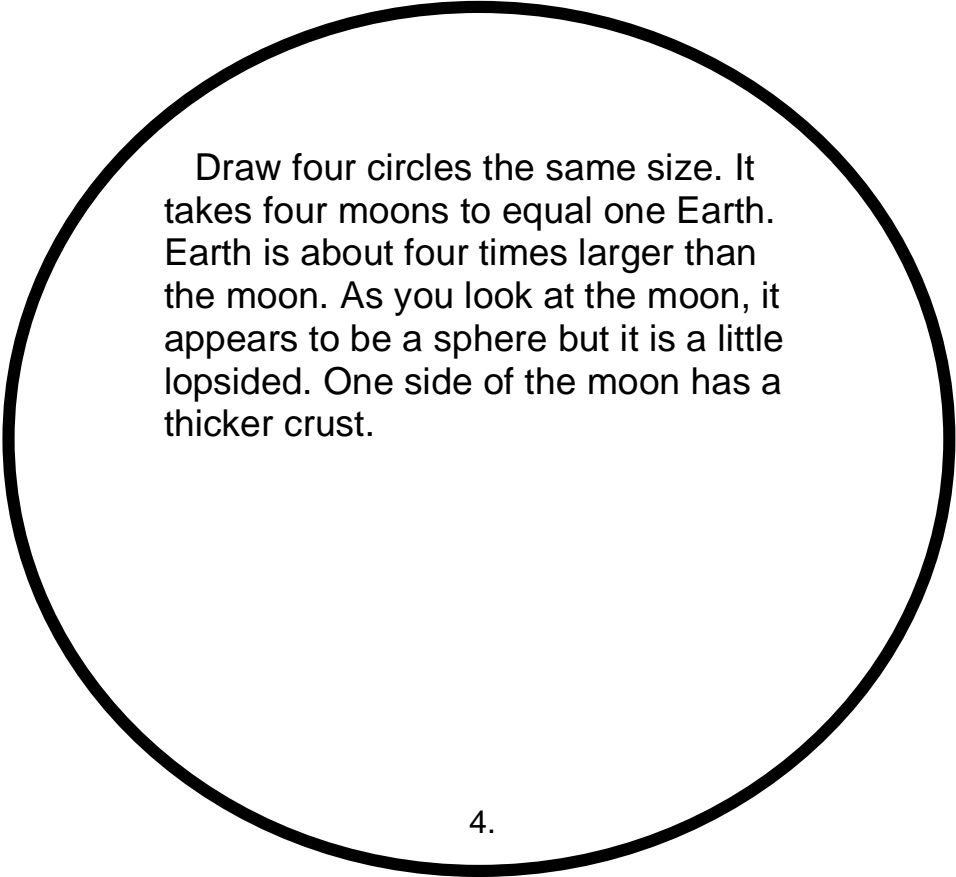
The moon is about 240,000 miles, or about 382,400 kilometers from Earth. It would take two to four days to travel there on a spacecraft.

2.



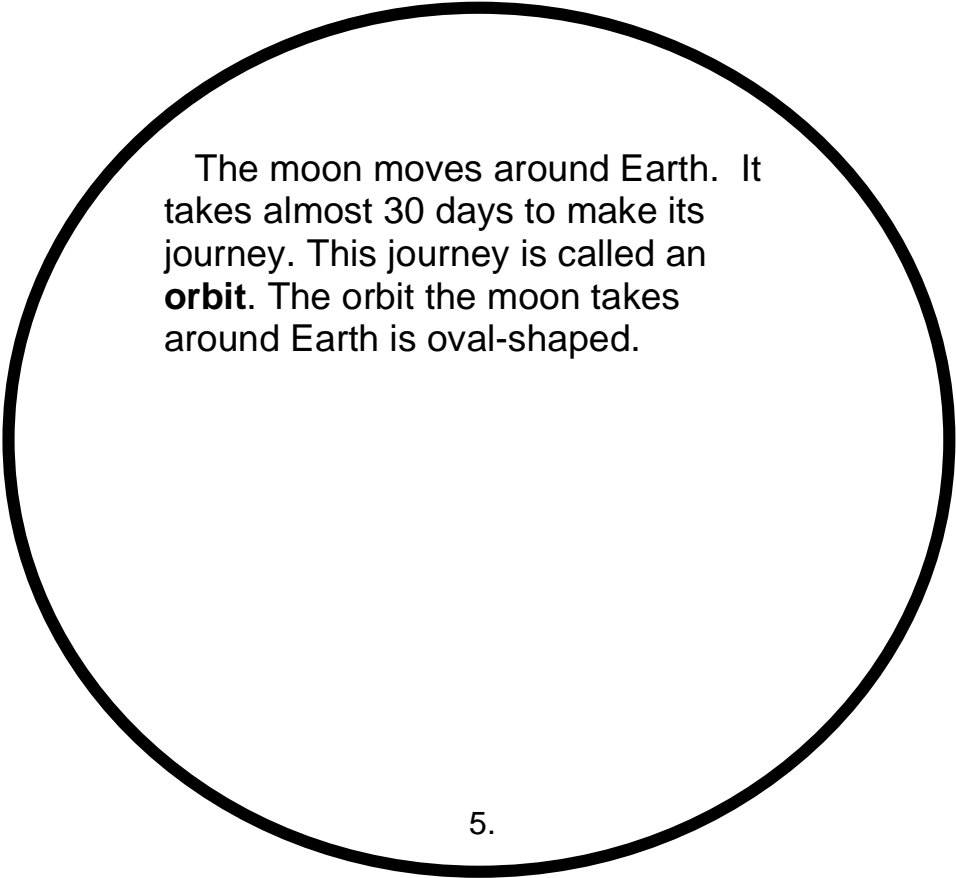
Scientists believe the moon is about 4.6 billion years old.

3.



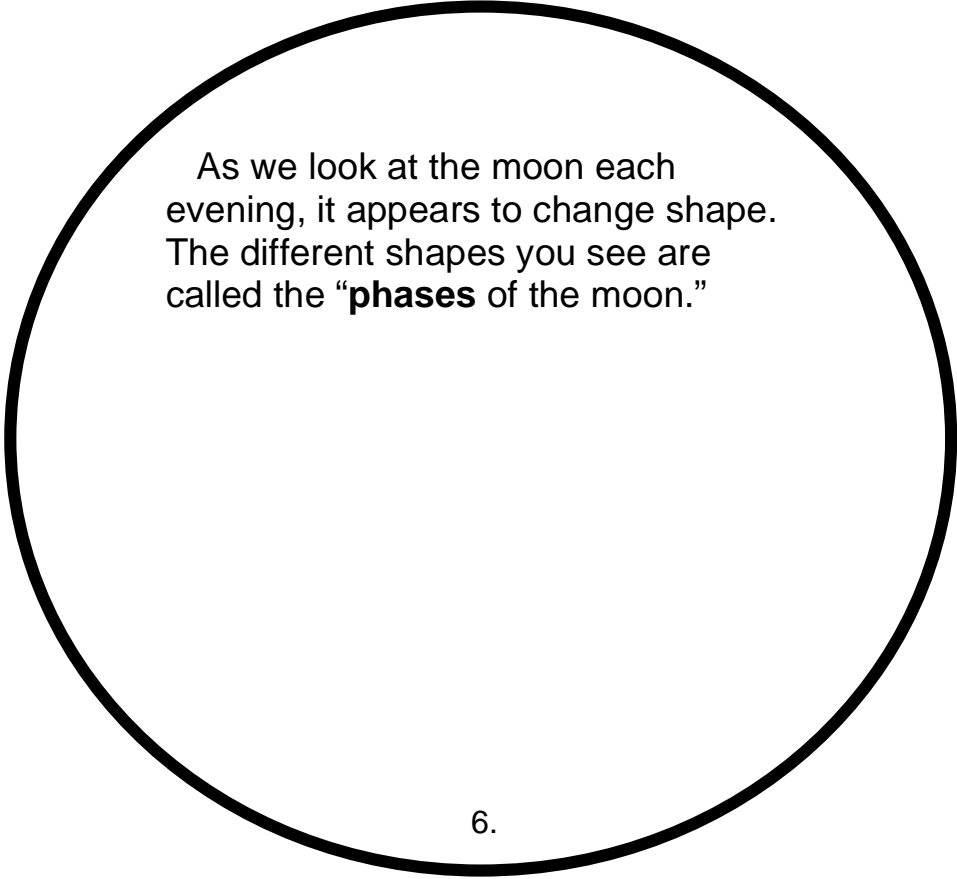
Draw four circles the same size. It takes four moons to equal one Earth. Earth is about four times larger than the moon. As you look at the moon, it appears to be a sphere but it is a little lopsided. One side of the moon has a thicker crust.

4.



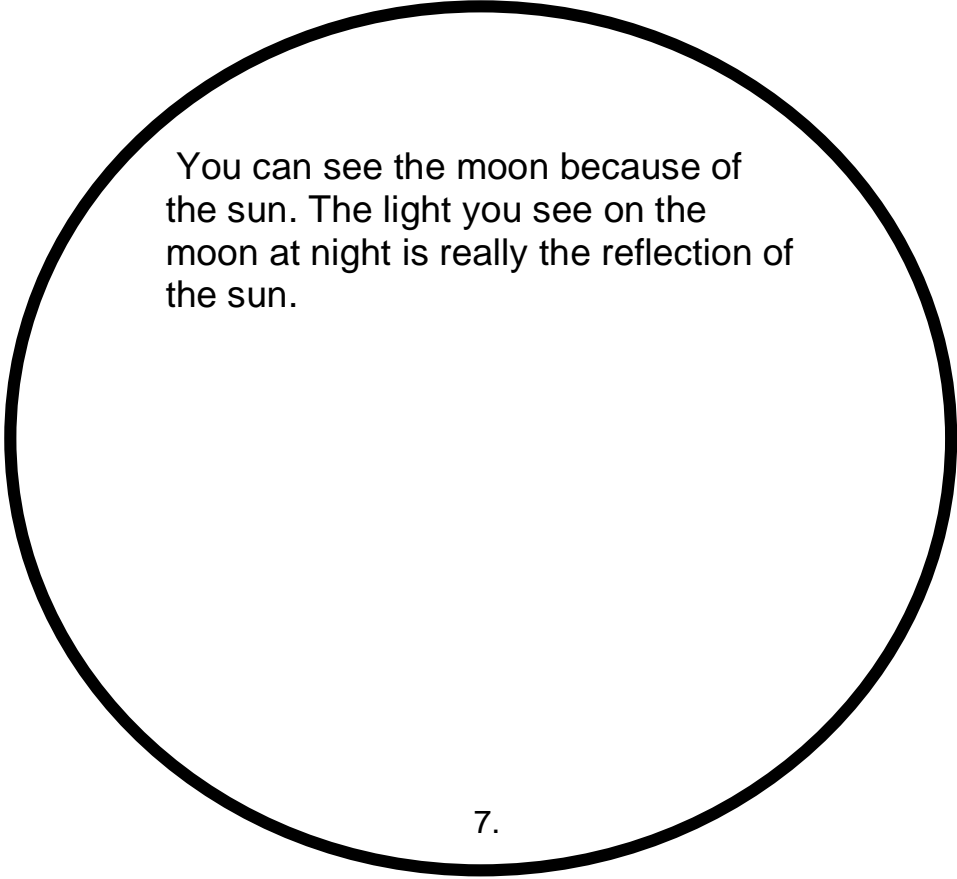
The moon moves around Earth. It takes almost 30 days to make its journey. This journey is called an **orbit**. The orbit the moon takes around Earth is oval-shaped.

5.



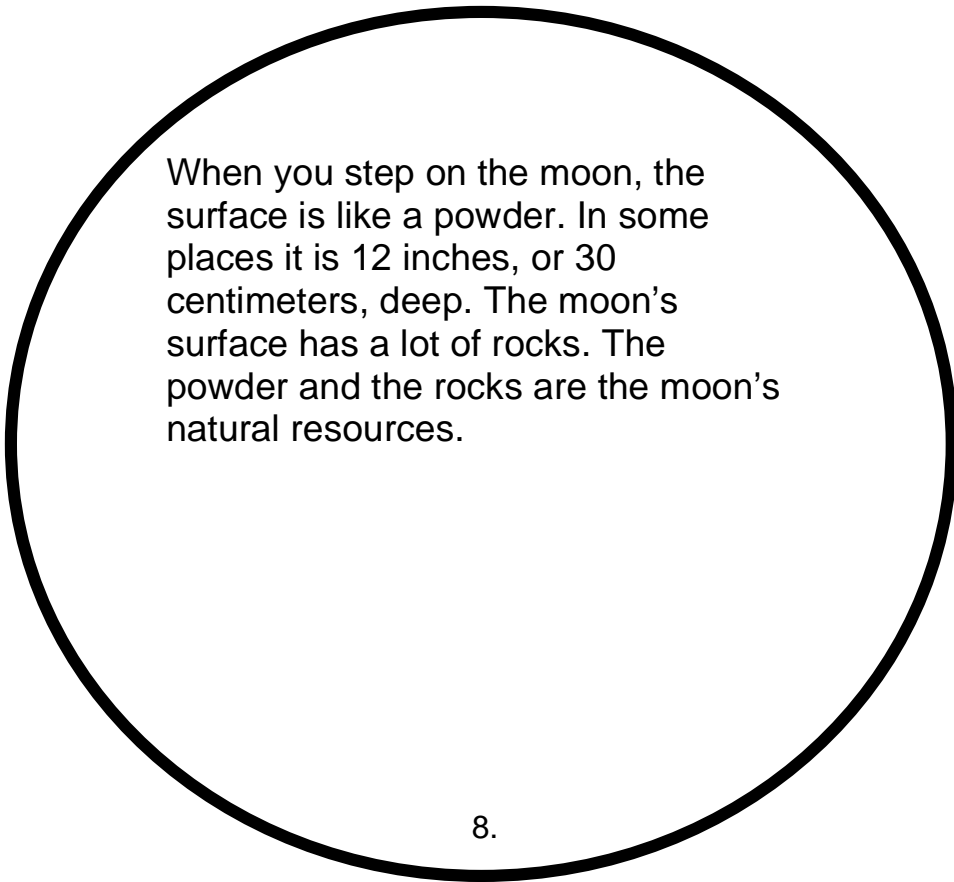
As we look at the moon each evening, it appears to change shape. The different shapes you see are called the “**phases** of the moon.”

6.



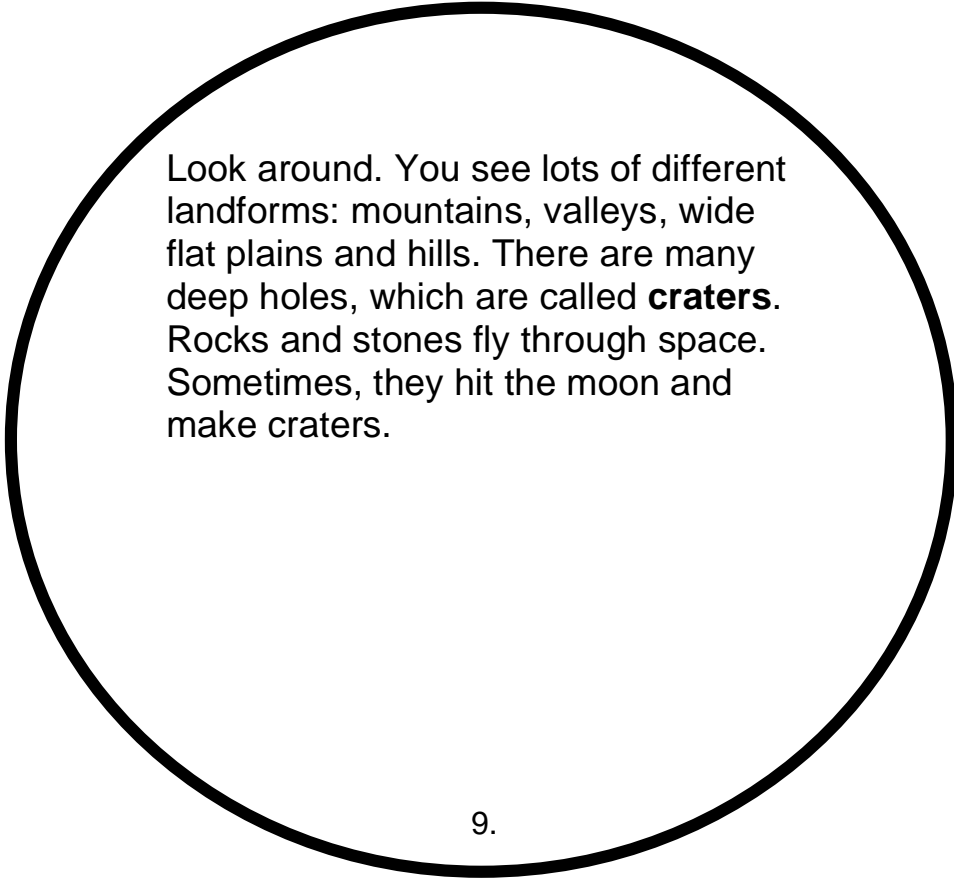
You can see the moon because of the sun. The light you see on the moon at night is really the reflection of the sun.

7.



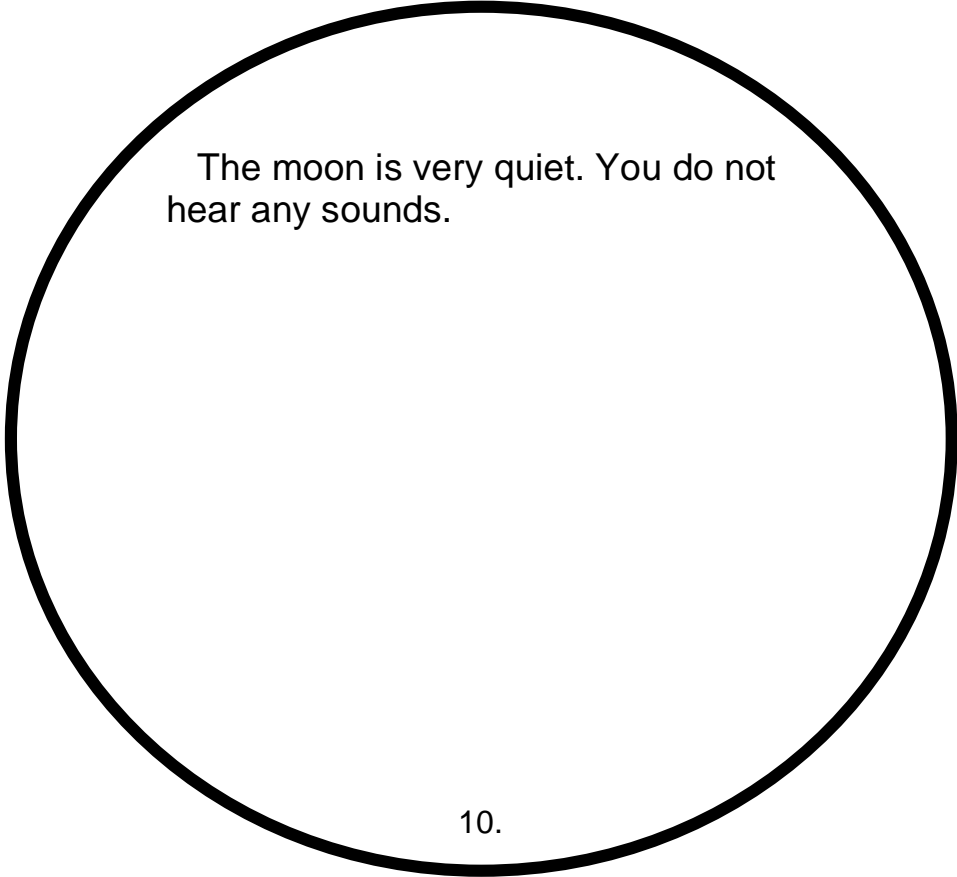
When you step on the moon, the surface is like a powder. In some places it is 12 inches, or 30 centimeters, deep. The moon's surface has a lot of rocks. The powder and the rocks are the moon's natural resources.

8.




Look around. You see lots of different landforms: mountains, valleys, wide flat plains and hills. There are many deep holes, which are called **craters**. Rocks and stones fly through space. Sometimes, they hit the moon and make craters.

9.



The moon is very quiet. You do not hear any sounds.

10.



There is no wind or rain on the moon.

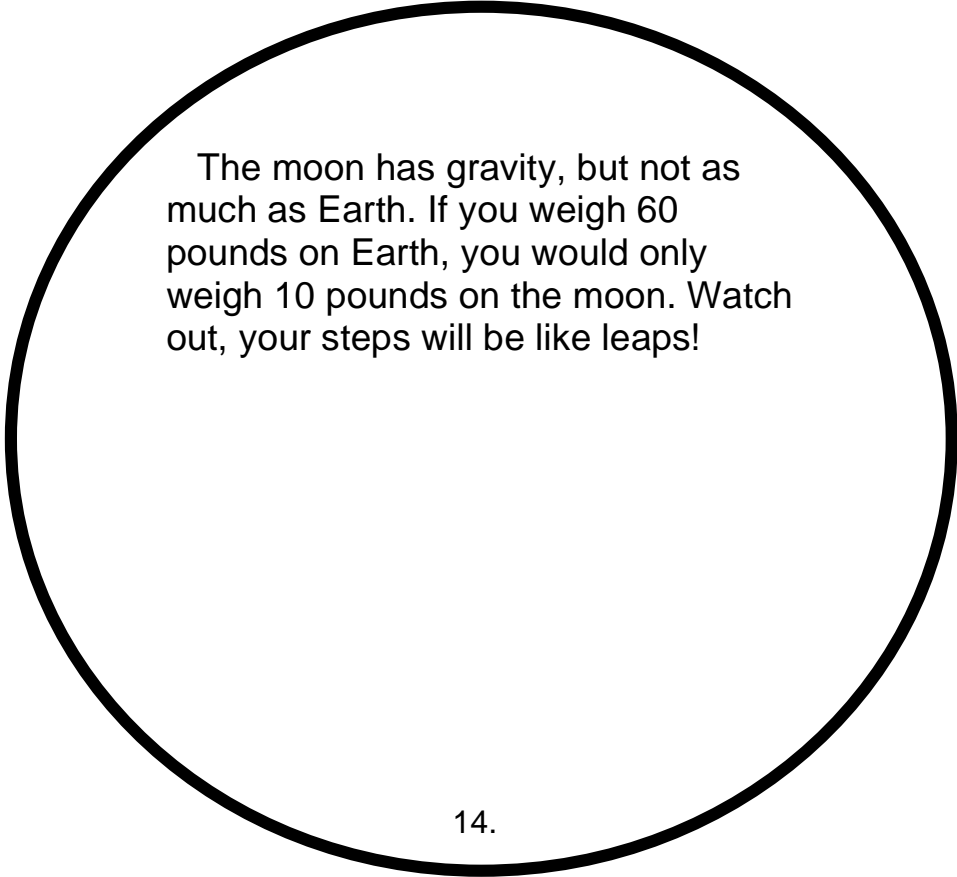
11.

The moon can get very hot (about 253 degrees Fahrenheit or 123 degrees Celsius) and very cold (about -387 degrees Fahrenheit or -233 degrees Celsius). Brrrrrrrrrrrrrrrrrr!

12.


No plants, animals or people live on the moon.

13.



The moon has gravity, but not as much as Earth. If you weigh 60 pounds on Earth, you would only weigh 10 pounds on the moon. Watch out, your steps will be like leaps!

14.



Maybe one day you will take a “leap” on the moon!

15.

Would you like to be an astronaut one day and travel to the moon? Why or why not?

16.

If people were to live on the moon, what would they need to survive?

17.