

# What causes an eclipse of the Moon?

## Objectives

Describe a lunar eclipse. Distinguish between a total and a partial lunar eclipse.

## Key Terms

**umbra** (UHM-bruh): center or dark part of a shadow

**penumbra** (pih-NUHM-bruh): light part of a shadow

**lunar eclipse** (ih-KLIHPS): passing of the Moon through Earth's shadow

**Casting Shadows** When you walk outside on a sunny day, you can see your shadow. A shadow is formed when an object blocks a light source. A shadow has two parts. The center of a shadow is very dark. The dark part of a shadow is called the **umbra**. Around the outside of a shadow, you will see a lighter part. The light part of a shadow is called the **penumbra**.

People and objects are not the only things that can cast shadows. Earth, the Moon, and other bodies in space also cast shadows.

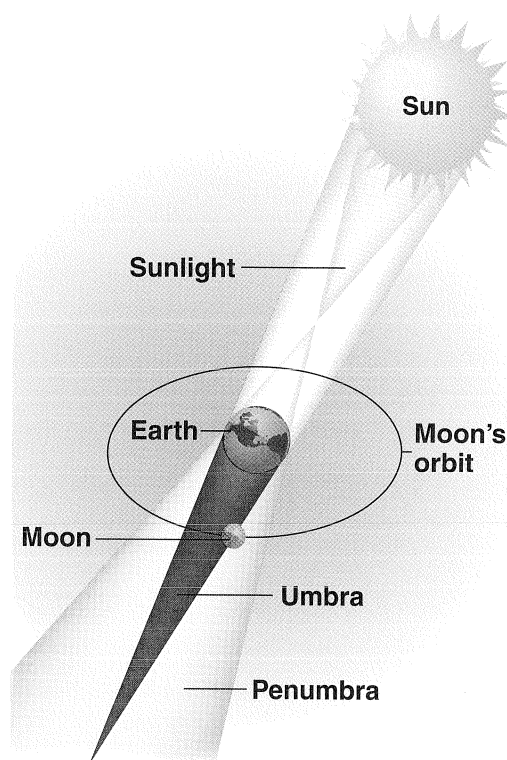
**1 IDENTIFY:** What are the two parts of a shadow?

**Eclipse of the Moon** As the Moon revolves around Earth, it usually passes above or below Earth's shadow. Sometimes the Moon passes directly through Earth's shadow. As a result, sunlight is blocked from reaching the Moon. When the sunlight is blocked from the Moon, a **lunar eclipse** occurs. A lunar eclipse can occur only during the full-Moon phase.

**2 DEFINE:** What is a lunar eclipse?

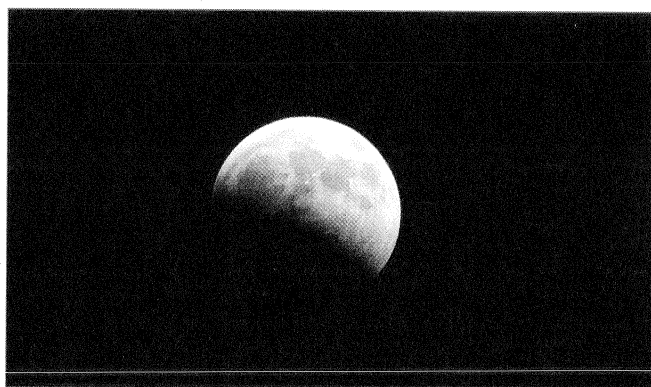
**Total or Partial Eclipses** Sometimes the Moon moves entirely into Earth's umbra. When this happens, all of the Sun's light is blocked. The entire face of the Moon darkens. This is called a total lunar eclipse.

Sometimes, only part of the Moon moves into Earth's umbra. Sunlight can still reach the Moon. As a result, only part of the Moon darkens. This is called a partial lunar eclipse.



▲ Figure 14-20 A partial lunar eclipse

Total lunar eclipses are rare. Also, they do not occur at regular intervals. They may occur as often as six months apart or as much as 2½ years apart.



▲ Figure 14-21 A partial lunar eclipse

**3 DESCRIBE:** How does the Moon look during a total lunar eclipse?

## ✓ CHECKING CONCEPTS

1. The dark part of a shadow is the \_\_\_\_\_.
2. A lunar eclipse occurs when Earth is between the \_\_\_\_\_ and the Moon.
3. A \_\_\_\_\_ lunar eclipse occurs when part of the Moon is in Earth's penumbra.
4. During a \_\_\_\_\_ lunar eclipse, all of the Moon is dark.



## THINKING CRITICALLY

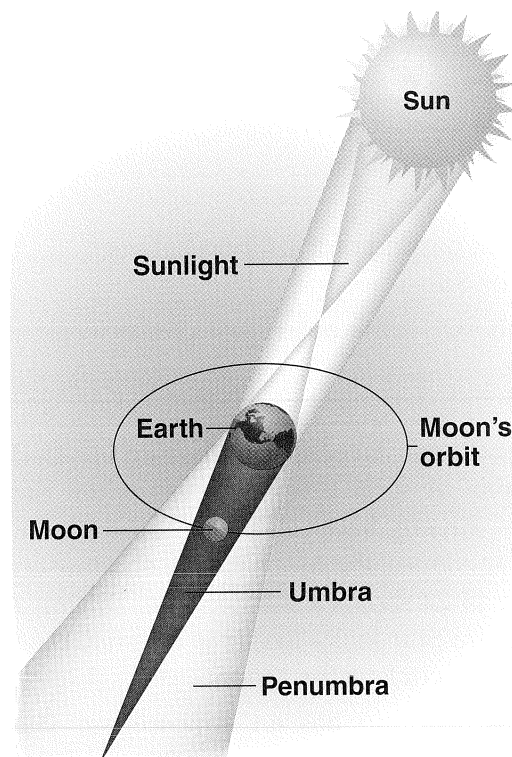
5. **HYPOTHESIZE:** When would a partial lunar eclipse be difficult to see?
6. **INFER:** Can a lunar eclipse occur during the quarter-Moon phase? Why or why not?
7. **INFER:** Can Earth's shadow have only an umbra and not a penumbra? Explain your answer.

## INTERPRETING VISUALS

Use Figure 14-22 to answer the following questions.

8. **EXPLAIN:** The Moon in Figure 14-22 is in a total eclipse. What would happen if the Moon were to move into the penumbra?

9. **HYPOTHESIZE:** If Earth and the Moon were closer to the Sun, how would the size of the umbra change?
10. **EXPLAIN:** Why can a lunar eclipse only occur during a full Moon?



▲ Figure 14-22 A total lunar eclipse



## Hands-On Activity

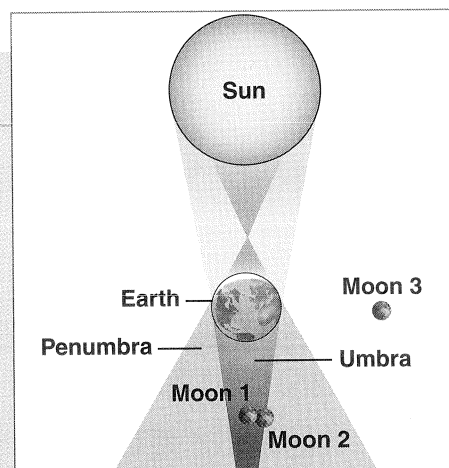
### MODELING LUNAR ECLIPSES

You will need tracing paper, a ruler, and a pencil.

1. Figure 14-23 shows the Moon in three different positions as it revolves around Earth. Copy the diagram onto a sheet of paper.
2. Indicate on your diagram which position represents a total eclipse, which represents a partial eclipse, and which represents no eclipse of the Moon.

### Practicing Your Skill

3. **ANALYZE:** Does Position 1 represent a total eclipse, a partial eclipse, or no eclipse of the Moon? Explain.
4. **ANALYZE:** Does Position 2 represent a total eclipse, a partial eclipse, or no eclipse of the Moon? Explain.
5. **ANALYZE:** Does Position 3 represent a total eclipse, a partial eclipse, or no eclipse of the Moon? Explain.
6. **MODEL:** Draw a model of a total eclipse of the Moon.



▲ Figure 14-23 The Moon revolving around Earth