

14-8

What causes an eclipse of the Sun?

Objective

Explain how a solar eclipse occurs.

Key Terms

solar eclipse: passing of the Moon between Earth and the Sun

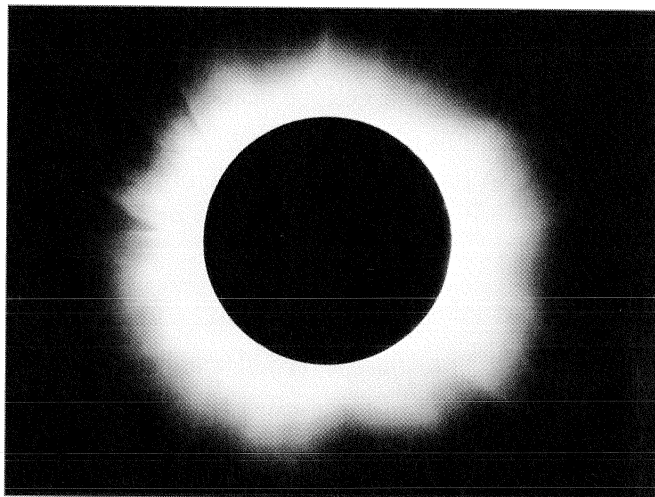
corona (kuh-ROH-nuh): outer layer of the Sun's atmosphere

Casting Shadows An eclipse of the Sun is called a **solar eclipse**. A solar eclipse occurs when the Moon passes directly between Earth and the Sun. During a solar eclipse, the Moon casts a shadow on Earth. Figure 14-24 shows a solar eclipse. During a solar eclipse the Sun looks like it is covered by a black circle. This circle is the Moon.

Like Earth, the Sun has an atmosphere. The outer layer of the Sun's atmosphere is called the **corona**. The corona is like a halo around the Sun. Usually, the corona cannot be seen from Earth because the Sun itself is so bright. During a solar eclipse, however, most of the Sun's surface is blacked out. As a result, the corona can be seen from Earth.

1 DEFINE: What is a solar eclipse?

Kinds of Solar Eclipses Like lunar eclipses, solar eclipses can either be total or partial. A total solar eclipse occurs when the entire face of the Sun is blocked by the Moon. Only the outer atmosphere of the Sun still shows. A partial solar eclipse happens when only part of the Sun's face is blocked.



▲ **Figure 14-24** A total solar eclipse

2 DESCRIBE: What causes a total solar eclipse?

Viewing Solar Eclipses Look at Figure 14-25 below. When the Moon's umbra touches Earth, people within it see a total solar eclipse.

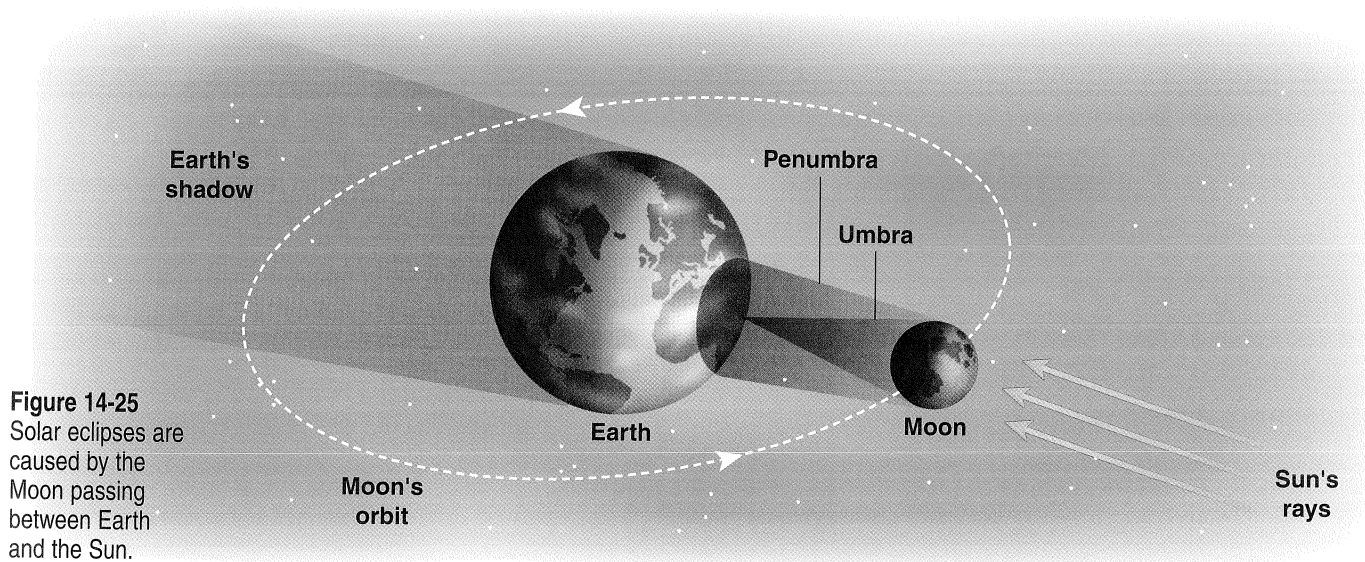


Figure 14-25 Solar eclipses are caused by the Moon passing between Earth and the Sun.

The umbra of the Moon is very small. Therefore, a total solar eclipse is visible from only a small area of Earth. People who are in the Moon's penumbra see a partial solar eclipse.

The penumbra of the Moon's shadow is much larger than the umbra. As a result, a partial solar eclipse can be seen over a larger area of Earth than a total solar eclipse can. Partial solar eclipses are seen more often than total solar eclipses.

- 3 IDENTIFY:** Which kind of solar eclipse is seen more often, a total or a partial solar eclipse?

✓ CHECKING CONCEPTS

1. When does a solar eclipse occur?
2. What is a partial eclipse of the Sun?
3. What happens when the Moon's umbra touches Earth?
4. Which part of the Moon's shadow is the largest?



THINKING CRITICALLY

Use Figure 14-25 to answer the following questions.

5. **ANALYZE:** What part of the Moon's shadow are you in if you see a total solar eclipse?
6. **EXPLAIN:** What can people outside the area of a total solar eclipse see?
7. **COMPARE:** How are total eclipses of the Moon and the Sun similar?
8. **INFER:** Why is a partial solar eclipse seen more often than a total solar eclipse?

HEALTH AND SAFETY TIP

Never look directly at the Sun, especially during a total solar eclipse. Doing this can cause permanent eye damage. Some people use a special filter to view the Sun. However, poorly made filters can also cause eye damage. The best way to watch a solar eclipse is with a pinhole box. Go to www.conceptsandchallenges.com to learn how to make one. Use the key search words **pinhole box**.



How Do They Know That?

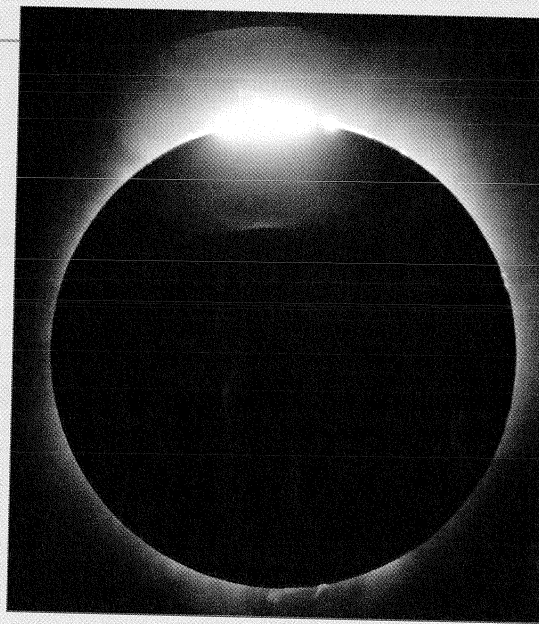
PREDICTING SOLAR ECLIPSES

People have always been fascinated by solar eclipses. In some cultures, solar eclipses were connected with superstition, mystery, and fear. Some ancient cultures thought the darkened sky caused by a solar eclipse was a sign of the displeasure of certain spirits. The ancient Chinese thought that solar eclipses happened when a dragon in the sky tried to swallow the Sun.

Descriptions of solar eclipses have been found dating back many centuries. In Babylon, a record of solar eclipses was kept from 747 B.C. on. In China, 36 solar eclipses were recorded between 720 B.C. and 495 B.C. Scientists have calculated the exact dates of many past solar eclipses. The records of eclipses in ancient writings have been used to pinpoint the dates of historical events.

Today, scientists can accurately predict solar eclipses. This is important in the study of the Sun and the Moon.

Thinking Critically Why do you think solar eclipses were once feared?



▲ **Figure 14-26** This moment during a solar eclipse is known as the diamond ring effect. Can you see why?