SCIENCE MUSEUM OF VIRGINIA

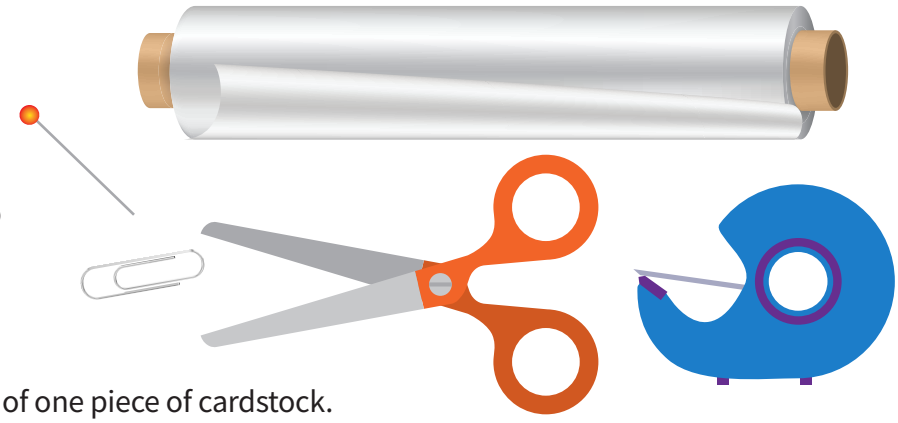
Solar Eclipse Viewer

A solar eclipse happens when the Moon is positioned between Earth and the Sun. The Moon is about 400 times smaller than the Sun, but it's also about 400 times closer to Earth. When the Moon passes directly in front of the Sun, it casts a shadow over the Earth. Here's a way to make a pinhole viewer so you can safely and indirectly observe a solar eclipse.

Safety first! Never look directly at the Sun and never use regular sunglasses to observe the Sun. Looking directly at the Sun is like using a magnifying glass to burn a piece of paper. The light-sensitive layer of tissue in the back of your eye that converts images into a signal for your brain is called the retina. Because the retina does not have pain receptors, you can easily and quickly damage your eye without realizing it.

What You'll Need

- 2 pieces of white cardstock
- Aluminum foil
- Tape
- Straight pin, thumbtack or paperclip
- Scissors



What You'll Do

1. Cut a 2 x 2 inch square in the middle of one piece of cardstock.
2. Tape a piece of aluminum foil over the hole.
3. Flip over the cardstock to the side without the tape. Take your pin and punch a small hole in the middle of the aluminum foil.
4. Take both pieces of cardstock outside with you.
5. Place your non-modified white cardstock on the ground. This is your screen.
6. Hold the cardstock with the aluminum foil and pinhole directly above the screen. Hold the foil side up and the tape side toward the ground.
7. Stand with the Sun **behind you** and look at the screen sitting on the ground. You will see the projected image of the Sun on the cardstock.
8. The farther away you hold your pinhole eclipse viewer, the bigger your projected image of the Sun will be.

As the Moon crosses between Earth and the Sun, more and more of your Sun image will disappear, forming a crescent-shaped image on your screen. Depending on where you are located during a solar eclipse, you may experience a partial or total eclipse. If you're in the path of totality, 100% of the Sun will be blocked by the Moon for a few minutes. If you're not in that path, you will experience a smaller percentage of Sun that's blocked.

What to Remember

This type of viewer is a version of a camera obscura. One of the earliest known uses of a pinhole viewer is mentioned in texts from 500 BCE in China! Leonardo da Vinci was fascinated by the camera obscura and left several diagrams of the device in his famous notebooks. Early camera obscuras used a pinhole like you are using here, but later ones incorporated a lens.

It can be hard to tell when viewing the Sun, but the image projected using a pinhole viewer is upside down! This happens because light travels in straight lines. Light from the top of an object passing through the pinhole hits the bottom of the screen and light from the bottom of the object passing through the pinhole reaches the top of the screen. This causes a reversed image to appear.

What to Try

What happens if you put more than one hole in your viewer? What happens if you use a colander? Any object with tiny holes can be used as a pinhole viewer. What other objects could you try?

Next, experiment with the size of the hole. Smaller holes produce a sharper but dim image. Larger holes produce brighter images because they let more light through but the image will be less focused. Keep trying different options until you find which size is most stellar!