



Before You Go

*Understanding Our
Solar System*



All trips start at the beginning. Before you take a trip into outer space, you need to begin by understanding astronomy. Astronomy is the branch of science that studies the stars (spinning balls of hot gas that release energy in the form of heat and light), planets (objects that travel around stars), and other objects in space. An astronomer is an expert in astronomy.

When the first astronomers looked into space, they used only their eyes. They tracked the path of the Moon and studied the location of the stars. But they wanted to learn more. In 1609, the Italian astronomer Galileo Galilei (1564–1642) first used a telescope to study space. (A telescope is a tubelike instrument that uses lenses to make distant objects appear nearer and larger.)

Astronomers like Galileo eventually learned many things about Earth in space. They learned that Earth is located in a solar system. (A solar system is a star with a group of planets and other objects traveling around it.) The star in the center of a solar system is a sun. Our sun is called the Sun. Revolving around our sun are nine planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. Some planets, like Earth, have one or more moons, which are objects that travel around a planet. Earth's moon is called the Moon.

But just learning about the stars, planets, and moons from Earth was eventually not enough for astronomers. They wanted to visit the places they had previously viewed only through a telescope.

This book will take you on an imaginary trip into space. But before you go, try the following activities to learn more about astronomy.

Project 1 **MIRROR, MIRROR**



Many years ago, people thought Earth was flat. They thought the Sun and Moon moved around Earth while Earth stood still. Then the first astronomers discovered that Earth is a round ball that moves. Try the following activity to "see" how Earth moves.

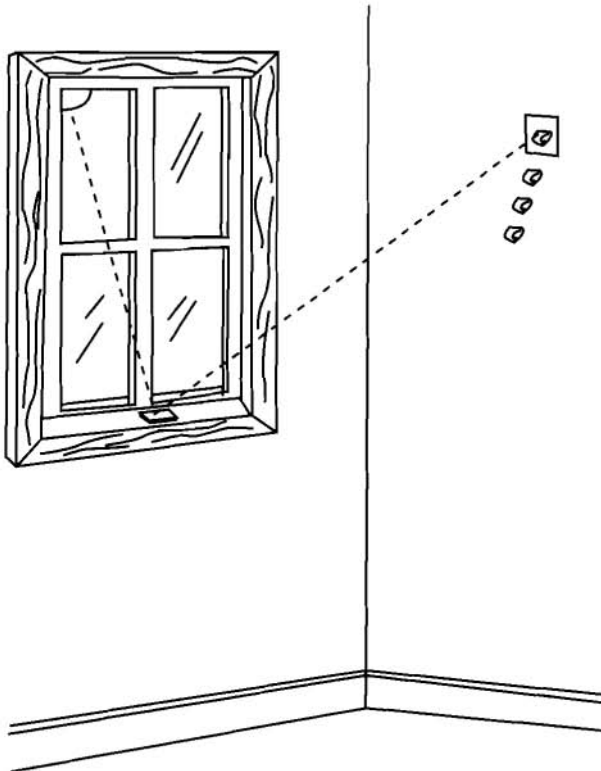
Materials

small mirror
masking tape
timer

Procedure

NOTE: This activity works best on sunny days.

1. Lay the mirror faceup on the sill of a window that faces south. Position the mirror so that the Sun **reflects** (bounces back) onto one of the walls of the room.
2. At exactly 12:00 noon, place a small loop of masking tape on the wall in the center of the mirror's reflection.
3. Every 5 minutes, for 30 minutes, place another small loop of tape in the center of the reflection. What do you notice after 30 minutes?
4. Leave the mirror undisturbed overnight. At exactly 12:00 noon the next day, place a small loop of tape on the wall in the center of the reflection.
5. For the next 2 weeks, place a small loop of tape on the wall in the center of the reflection each day at exactly 12:00 noon. What do you notice after 2 weeks?



Explanation

In the first 24 hours, the reflection moves across the wall in a straight line. The reflection moves because Earth spins. Earth makes one complete turn on its **axis** (an imaginary line that runs through the North and South poles of Earth) every 24 hours. (The **North Pole** is the northernmost point of Earth, and the **South Pole** is the southernmost point.) As Earth turns, the angle that the Sun makes with the mirror changes, causing the reflection to move.

When you place a piece of tape in the center of the reflection at the same time each day for 2 weeks, you notice that the reflection moves each day as well. (The new reflection is either higher or lower than the previous reflection, depending on the season. The new reflection will be higher in the fall and lower in the spring.) The reflection moves each day because Earth doesn't just spin on its axis. It also **orbits** the Sun, which means it moves in a circular path around the Sun. Earth makes one complete circle around the Sun each year, spinning as it orbits.

Earth is *slightly* tilted as it orbits the Sun in a counterclockwise direction. As Earth spins, its axis is tilted 23½ degrees ($23\frac{1}{2}^\circ$). This means that for half of its trip around the Sun, the **Northern Hemisphere** (top half of Earth) is tilted toward the Sun, and for the other half, it is tilted away from the Sun.

