

# EXPLORE

Recommended for grades 8 and up

## Program Overview

Have you ever wondered how our modern spacecraft can navigate quickly and accurately to Earth orbit and beyond? This show explores the story of humanity's fascination with the stars—from ancient stargazers to the breakthrough discoveries of scientists like Johannes Kepler. Kepler's Laws are fundamental in physics and astronomy and central to modern spaceflight. The show demonstrates how those laws work using simple, easy-to-understand animations and clear explanations.



## Show Synopsis

EXPLORE begins with a look at how scholars and scientists throughout the ages used the sky as a calendar and clock to measure the passage of time. Their charts and star catalogs became the basis of astrology, and informed the modern science of astronomy.

Kepler's theories about elliptical orbits opened the universe to exploration in ways he never dreamed of, centuries after his death. Transporting ships, people, and cargo beyond Earth depends on these laws of motion. To show how Kepler's Laws work in space exploration, EXPLORE takes us on an imaginary journey. Astronauts leave Earth, execute two Hohmann transfer maneuvers, and dock with a space station. Then they are off to Mars. In several beautiful scenes, the show demonstrates how spacecraft follow Kepler's laws in stately maneuvers as they make their way from Earth to orbit and then on to other worlds.

EXPLORE is a beautifully visualized trip through the history of astronomy, and an educational treasure trove. It presents a compelling story of skygazing, scientific discovery, and the wonders of exploration—past, present, and future.

A broad selection of science content is included in the show:

- elements of the history of astronomy;
- the heliocentric vs. geocentric models;
- the three laws of planetary motion;
- orbital maneuvers.

## Vocabulary

**astronomy**

**astrology**

**planet**

**epicycle**

**geocentric**

**heliocentric**

**ellipse**

**focus (of an ellipse)**

**orbit**

**Kepler's Laws**

**Hohmann transfer**

**phasing orbit**

## Suggested Resources

1. Kepler's Discovery website  
<http://www.keplersdiscovery.com>  
This site is an educational adventure into the concepts, thought processes and consequences of Kepler's discoveries. It provides an excellent supplement to secondary school and college classes on astronomy, mathematics and the history of science.
2. NASA Solar System Exploration site  
<https://solarsystem.nasa.gov/solar-system/our-solar-system/overview/>
3. Kepler's Laws of Planetary Motion website  
<http://zebu.uoregon.edu/textbook/planets.html>