



## UNIVERSE DISCOVERY GUIDES

April

# DISCOVERING PLANET FAMILIES



The Sun's Family (not to scale). Credit: NASA

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The universe is a place of change. NASA missions advance our understanding of the changing universe.

[www.nasa.gov](http://www.nasa.gov)

## DISCOVERING PLANET FAMILIES

There was a time when the Sun was thought to have a family of only 6 planets. For hundreds of years, astronomers speculated about the distant stars also having families of planets, but there was no way to find out. Fortunately, our understanding of the universe is always changing.

### Wandering Planets

When early astronomers looked into the night sky, they saw mostly stars, but five of those points of light “wandered” among the constellations of stars. The word “planet” comes from a Greek term meaning “wanderer.”



In April of 2002, the visible planets gathered in the western evening sky. (Next time is June 2040.)

As the five other planets (Mercury, Venus, Mars, Jupiter, and Saturn) orbit the Sun, from here on Earth we see them change position against the background stars.

Without telescopes, early astronomers were not aware of Uranus, Neptune, Pluto, or any of the other dimmer bodies wandering through our own Solar System.

## More Wandering Children Found — one by one

The invention of the telescope ushered in the discovery of even more wanderers within our Solar System. The timeline is shown on the right.

The planet Uranus was discovered in 1781, over 170 years after the telescope was invented. Then came the discovery of Ceres, Neptune, and finally little Pluto. And that was the end of planet-finding for more than 60 years.

## Planets-a-Plenty

Astronomers wanted to search among the stars, but planets around other stars are usually too faint to be observed directly, even with our best telescopes. So they had to find some other way.

After trying other techniques with limited success, astronomers in 1995 used instruments to detect the [tiny wobble of distant stars](#) that revealed the presence of orbiting planets. This “wobble” technique led to a surge of planet discoveries.

These weren't more wanderers circling our own Sun. These planets orbited other stars — stars that are thousands of times more distant than the planets in our own Solar System.

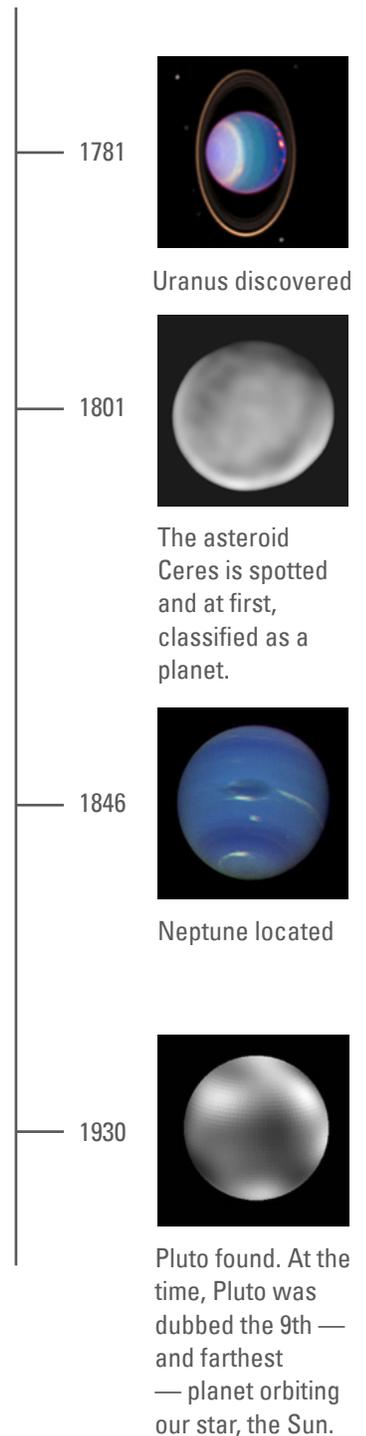
Over the following years, astronomers gathered evidence for hundreds of stars with families of planets, each family of planets different from our own. The search continues today, using multiple techniques for discovery.

## Can we see the stars that have planets?

Most of the stars discovered to have planets are too dim for us to see with just our eyes, but we can see some of these stars.

In fact, one of the very brightest stars with an orbiting planet is Pollux, a star in the constellation of Gemini. Pollux's planet was confirmed in 2006. This is the same year that Pluto was reclassified as a dwarf planet.

See even more stars with planets using these star maps: [Where are the Distant Worlds?](#)



Artist's concept of the Jupiter-sized planet orbiting Pollux. NASA/JPL/Caltech

## SKY FEATURE: POLLUX

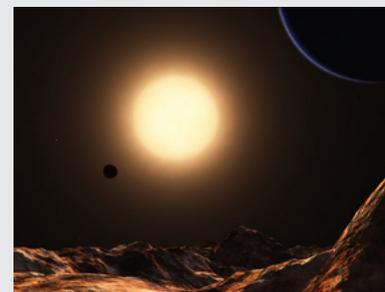
### How to Find it

**Distance:** 34 light-years

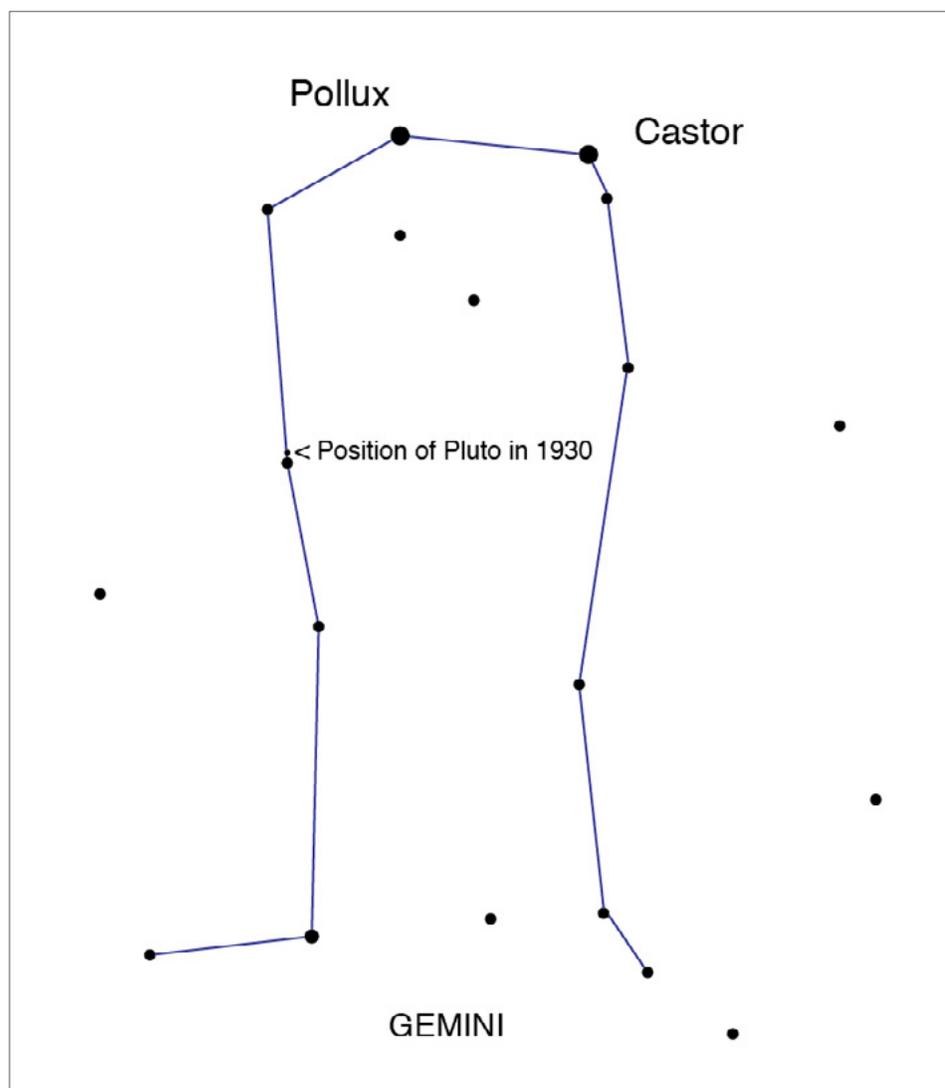
**Visual Magnitude:** 1.14

**To view:** Just your eyes

[Click here to jump to the full-sky April Star Map.](#)



Artist's Concept of Pollux with a family of planets. (Used with permission: Digital Drew Space Art)



### Do you know someone who is a twin?

Castor and Pollux are the brightest stars in the constellation of Gemini, the twins. In ancient stories, it was said the constellation represented twin brothers who were devoted to each other.

### How are the star Pollux and the dwarf planet Pluto related to each other — besides sharing 4 letters?

Pluto was first discovered in 1930 when it was positioned in the direction of the stars of Gemini, below Pollux. At the time Pluto was designated as a planet.

The planet orbiting Pollux was confirmed in 2006, the same year Pluto was reclassified as a dwarf planet.

## TRY THIS!

### Follow the entire history of the quest for planets around distant stars

Explore the interactive NASA PlanetQuest Historic Timeline:

<http://planetquest.jpl.nasa.gov/system/interactable/2/timeline.html>

Available as a video here: <http://planetquest.jpl.nasa.gov/video/48>



### Want to know the current planet count?

Scan the QR Code with your smartphone or go to the PlanetQuest website:

<http://planetquest.jpl.nasa.gov>



## ACTIVITY: HOW DO WE FIND PLANETS AROUND OTHER STARS?

Time: 10 minutes

Age: 8 and up

Discover the techniques scientists use to find planets orbiting distant stars: use a foam ball, a toothpick, and a small ball of clay.

[http://nightsky.jpl.nasa.gov/download-view.cfm?Doc\\_ID=59](http://nightsky.jpl.nasa.gov/download-view.cfm?Doc_ID=59)



### Find more NASA Activities

Looking for more Earth and Space Science formal and informal education activities?

Try out NASA's digital collection of resources at NASA Wavelength:  
<http://nasawavelength.org>



<http://nasawavelength.org>

## CONNECT TO NASA SCIENCE

### How do we know?

How do scientists confirm it's a planet? NASA's PlanetQuest gives us the scoop:

<http://planetquest.jpl.nasa.gov/page/methods>

**PLANET QUEST**  
THE SEARCH FOR ANOTHER EARTH

<http://planetquest.jpl.nasa.gov>

### Planet Families: From Imagination to Discovery

Most of the planets discovered around other stars have been huge, like Jupiter. This is because planets with larger masses are easier to detect. As our techniques and technologies improve, we are finding more and more small planets, including many Earth-sized planets. As we fill in the family portraits of planets, we increase the odds of discovering a true sister planet to the Earth.



Artist's concept of the variety of planets that might orbit distant stars.

Credit: NASA/JPL-Caltech/R. Hurt (SSC-Caltech)

More about the history and science of finding planets from NASA's PlanetQuest:

<http://planetquest.jpl.nasa.gov/science>

## Discovering Pollux's Planet

Here's the story of how Pollux's planet was discovered.

<http://www.nasa.gov/vision/universe/newworlds/Pollux.html>

For the latest news on planet discoveries:

<http://planetquest.jpl.nasa.gov/news>

## Planet Families Include Little Ones

NASA's Spitzer Space Telescope confirmed one of the smallest known alien planets. The planet is not only smaller than the Earth, but the star-planet system is close to Earth, only 33 light-years away — about the same distance as the Pollux system.

<http://www.spitzer.caltech.edu/images/5199-ssc2012-11a-Exoplanet-is-Extremely-Hot-and-Incredibly-Close-Artist-s-Concept>

For the latest news from Spitzer, visit

<http://www.spitzer.caltech.edu/news>



Artist's concept of planet smaller than Earth. NASA/JPL-Caltech/R. Hurt (SSC)

## ACKNOWLEDGEMENTS

The Universe Discovery Guides are a collaborative effort between members of the NASA Astrophysics education and public outreach (E/PO) community and the NASA Astrophysics Science Education and Public Outreach Forum. We also gratefully acknowledge the informal educators from the Astronomy from the Ground Up (AFGU) and the Sky Rangers communities who field-tested the guides.

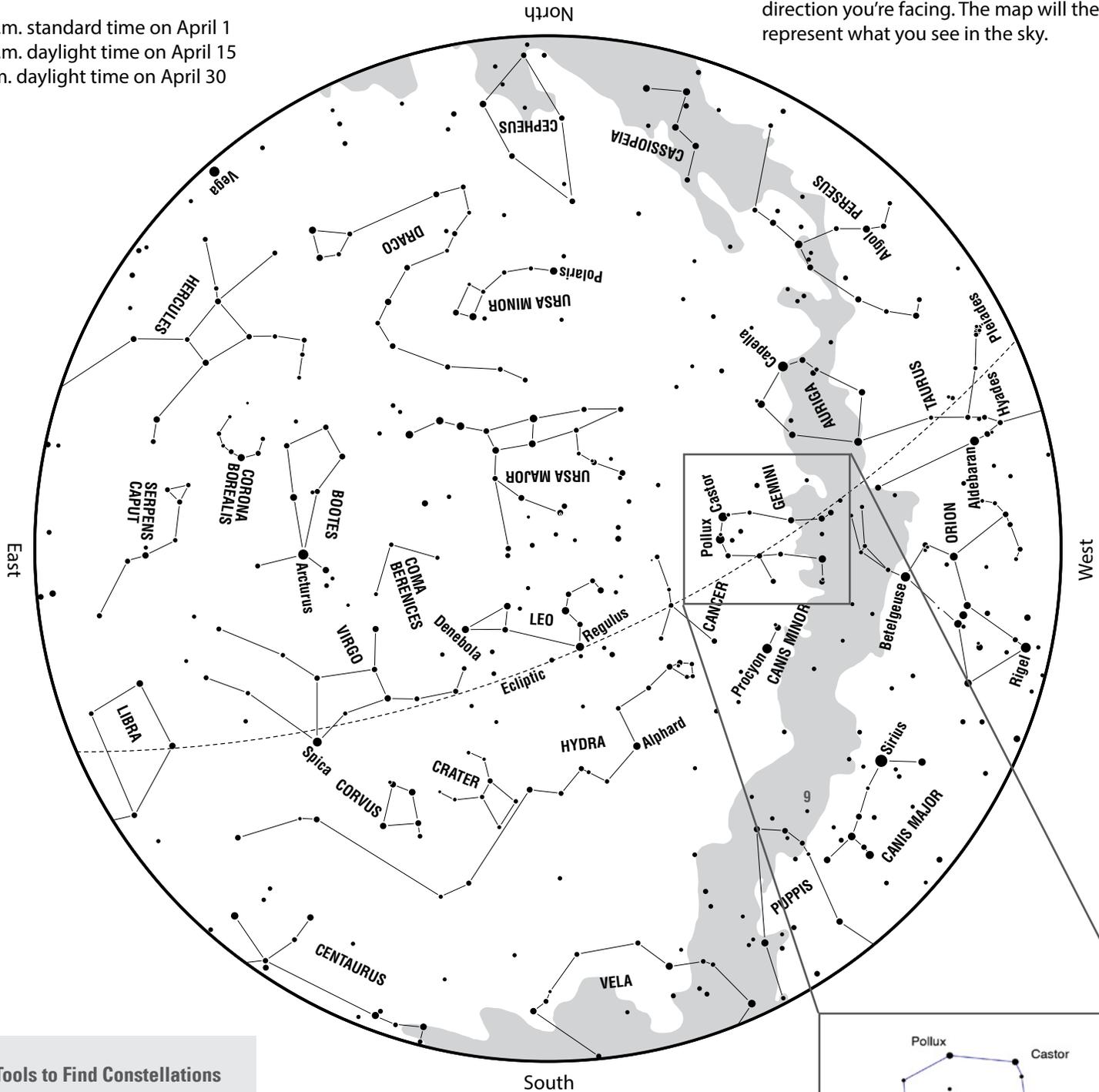
Contributing NASA Astrophysics E/PO programs include: Afterschool Universe, Alien Earths, Astronomy Picture of the Day (APOD), the Chandra X-ray Observatory, the Cosmic Background Explorer (COBE), Cosmic Questions, the Euclid mission, Exoplanet Exploration, the Fermi Gamma-ray Space Telescope, the Galaxy Evolution Explorer (GALEX), the Herschel Space Observatory, the High Energy Astrophysics Science Archive Research Center (HEASARC), the Hubble Space Telescope, Imagine the Universe, the Infrared Processing and Analysis Center (IPAC), the James Webb Space Telescope, the Kepler Mission, the Milky Way Project, the Night Sky Network (NSN), the Nuclear Spectroscopic Telescope Array (Nu-STAR), Observing with NASA (OwN), Other Worlds, the Planck mission, PlanetQuest, Planet Hunters, the Spitzer Space Telescope, StarChild, the Stratospheric Observatory for Infrared Astronomy (SOFIA), the Swift mission, the Two Micron All-Sky Survey (2MASS), the Wide-Field Infrared Survey Explorer (WISE), the Wilkinson Microwave Anisotropy Probe (WMAP), the X-ray Multi-Mirror Mission (XMM-Newton), and Zooniverse.

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The all-sky map represents the night sky as seen from approximately 35° north latitude at the following times:

- 10 p.m. standard time on April 1
- 10 p.m. daylight time on April 15
- 9 p.m. daylight time on April 30

To locate stars in the sky, hold the map above your head and orient it so that one of the four direction labels matches the direction you're facing. The map will then represent what you see in the sky.



### Tools to Find Constellations

#### For mobile device users:

Search your app store for “planetarium” or “sky map” to find free or low-cost apps. These help you more easily locate constellations.

[View a video on how to read a star map.](#)

### April Sky Feature: Pollux

[Jump to Sky Feature to find out about Pollux](#)

