Trip Around the Triangle

What can be seen in the Summer Triangle? Where did the Kepler Mission search for Earthlike planets?

About the Activity

Visitors to a star party use a printed handout to take a trip through the telescopes to view to view the variety of naked-eye and telescopic treats that occupy this very popular area of the night sky: the Summer Triangle, including the area of the sky where the Kepler Mission monitored over 150,000 stars in a search for Earth-like planets

Location and Timing

This activity is perfect for use at the telescopes during a star party. The "Trip Around the Triangle" can be used for the duration of the star party, typically one or two hours.

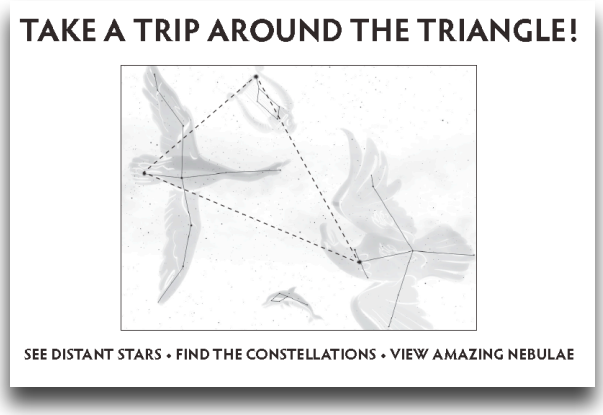
The stars in the Summer Triangle are visible in the evening sky from June through January and in the pre-dawn sky February

Participants

Appropriate for families, the general public, and school groups ages 7 and up.

Topics Covered

- What can be seen with and without a telescope in and around the Summer Triangle asterism
- The location of the Kepler Mission's target field of view and its primary mission
- Finding the stars of a selection of constellations



Materials Needed

- Telescopes
- Pens or pencils
- Double sided printouts of the handout
- Stickers or small prizes (optional)

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Additional astronomy activities can be found here: http://nightsky.jpl.nasa.gov

Set Up Instructions

- Make enough copies of the Trip Around the Triangle handout for each visitor.
- Have pencils or pens on hand.
- *Optional:* Supply completion stickers or small prizes.
- Give each participating club member a copy of the handout. Explain that your visitors will have these and be on a "Trip" to look at objects on the handout. Members operating telescopes are not limited to the objects listed or just to the area surrounding the Summer Triangle. Your visitors will just be asking the operator whether or not the object being viewed is on the handout.
- One or two members may want to volunteer to point out constellations or other naked-eye objects on the "Trip".

Background Information

Trip around the Triangle objects

Gliese 777 (also known as HD 190360): Star 52 light years away with at least 2 planets and one companion star:
http://planetquest.jpl.nasa.gov/exoplanet/302

Xi (or ksi) Aquilae: A gas giant planet orbiting a K-type star:
http://planetquest.jpl.nasa.gov/exoplanet/600

Kepler Search Area: For more information on the Kepler Mission and its target field of view:
http://kepler.nasa.gov/

To locate other objects on the handout, refer to star maps in any astronomy-related magazine or observing manual.

Detailed Activity Description

Leader's Role	Participants' Role
Introduction with your visitors: *To Ask:* Who can show me what a Triangle looks like? *To Say:* Well, tonight you will each take a trip around a triangle – the "Summer Triangle" – as you look through our club members' telescopes tonight. *To Do:* Hold up a copy of the handout. *To Say:* Here are all the sights you might have a chance to see. Some you can see with just your eyes, others you'll want to find a telescope operator who can show you the object. Just ask each telescope operator what he or she is showing and whether it is on your trip list. Be sure not to miss the area where **NASA's Kepler Mission** found Earth-size planets around other stars. The Kepler Mission, a space-based telescope, continuously monitored 150,000 stars in one area of the Summer Triangle for a period of more than four years. Hold your fist out at arm's length. That's about the size of the area of the sky Kepler monitored for Earth-size planets. After it gets dark, I (or another member) can show you where that area is. You might want to check off each item on your Trip as you find it. *(Optional):* After you have seen at least (three / six / pick a number) sights on the Trip, you will have earned a completion sticker. (Explain the procedure you have chosen to distribute completion stickers or other prize). *To Do:* Pass out handouts. *To Say:* So enjoy your Trip around the Triangle tonight!	Participants hold their hands or arms in the form of a triangle. Hold out fists.

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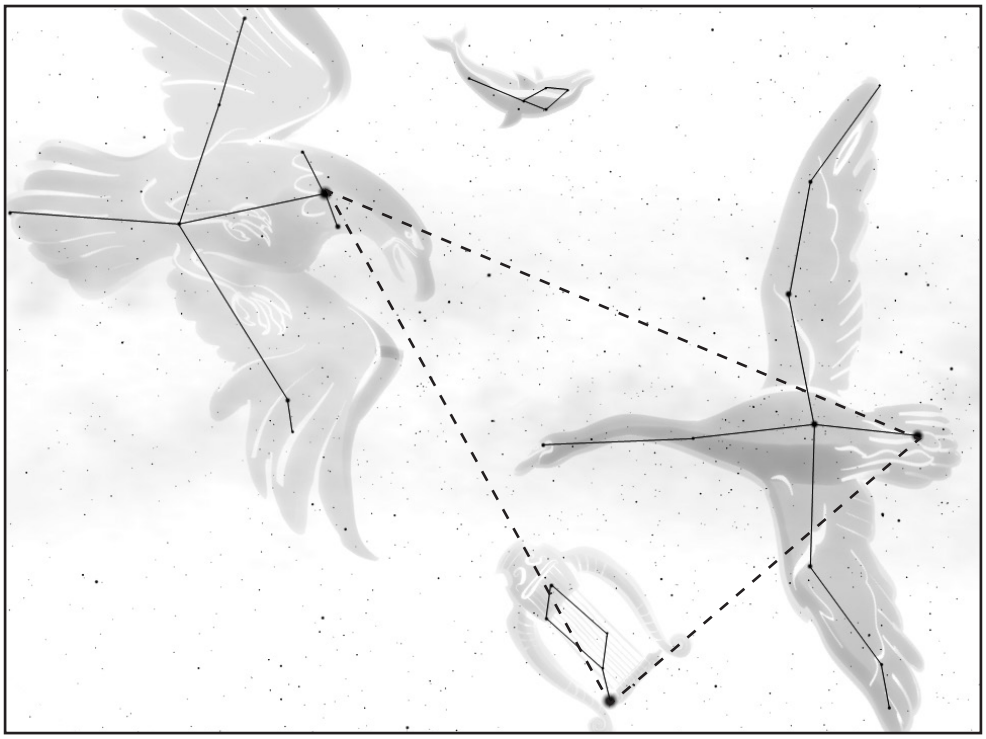
SEE DISTANT STARS • FIND THE CONSTELLATIONS • VIEW AMAZING NEBULAE



TAKE A TRIP AROUND THE TRIANGLE!

The Search for Exoplanets

The centuries-old quest for other worlds like our Earth has been reignited by the discovery of hundreds of planets orbiting other stars, called *exoplanets*. Scientists are just beginning to better understand the variety of planetary systems in our stellar neighborhood thanks to improved instruments and technology.

NASA's Kepler Mission, a space-based telescope, monitored more than 150,000 stars in a star field in the Summer Triangle for over four years. Scientists are searching for Earth-like exoplanets, especially those in the habitable zone of their stars where liquid water and possibly life might exist.

Kepler was designed to find exoplanets by looking for tiny dips in the brightness of a star when a planet crosses in front of it and blocks a little bit of the star's light — we say the planet *transits* the star.

"... the ways by which men arrive at knowledge
of the celestial things are hardly less wonderful
than the nature of these things themselves"
— *Johannes Kepler*

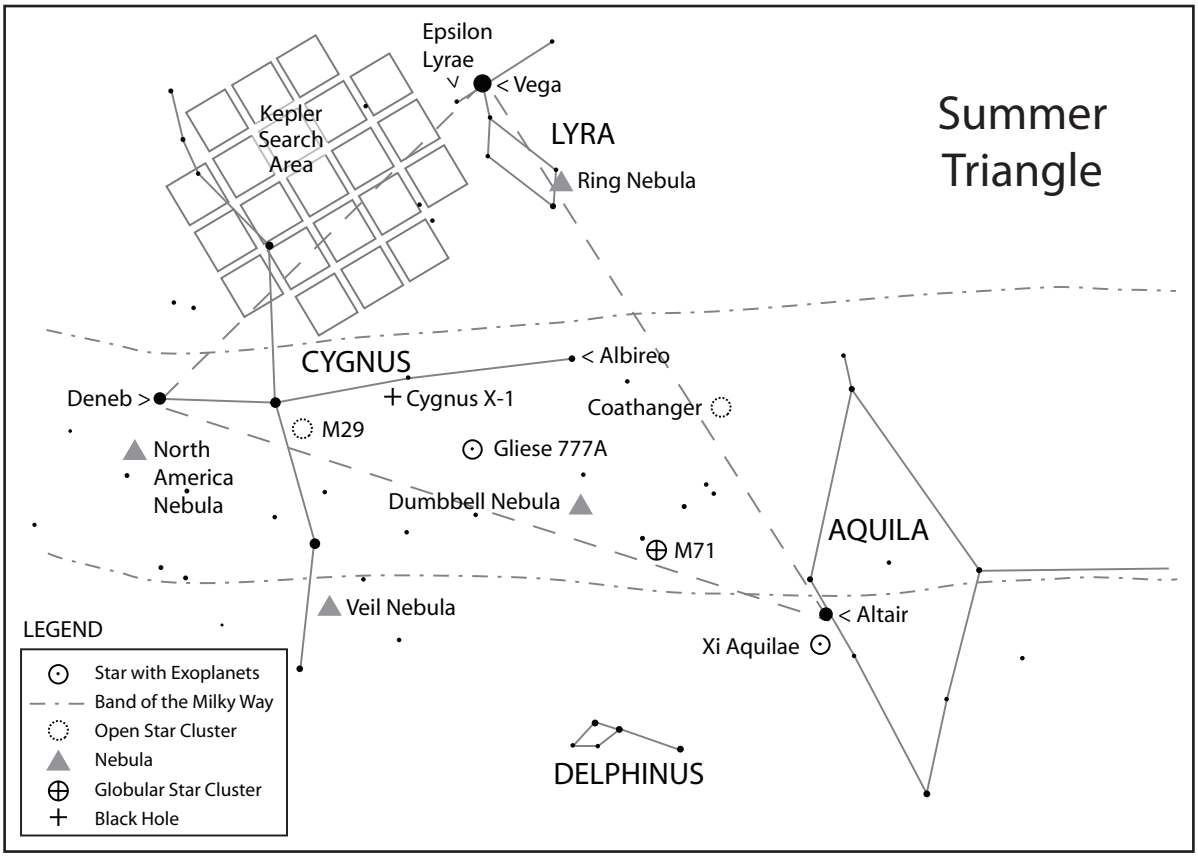
Kepler

For more information on NASA's *Kepler Mission* to search for Earth-size planets:

http://Kepler.NASA.gov

NASA Night Sky Network (nightsky.jpl.nasa.gov) administered by Astronomical Society of the Pacific (astrosociety.org)

WHAT CAN YOU FIND IN THE TRIANGLE?



Stars & Star Clusters

- Vega
- Deneb
- Altair
- Albireo
- Coathanger *
- Epsilon Lyrae *(double-double stars)**
- Gliese 777A *(a star with exoplanets)**
- Xi (ksi) Aquilae *(a star with exoplanets)*
- M29 *(Open star cluster)**
- M71 *(Globular star cluster)**
- Cygnus X-1 *(location of a black hole)*

Constellations

- CYGNUS
- LYRA
- AQUILA
- DELPHINUS

Nebulae

- Ring *(planetary - dying star)**
- North America *(gas & dust cloud)**
- Dumbbell *(planetary - dying star)**
- Veil *(supernova remnant)**

Other

- Band of the Milky Way
- Kepler Search Area

The area of the sky that Kepler monitored is just a little larger than your fist held at arm's length.

*** Visible in the telescope or binoculars**
(depending on sky conditions)