Supplemental Educational Support Materials
for Special Feature: “Twenty Years of Detecting Exoplanets”

Discussion questions

Q1: What properties of extrasolar planets make them difficult to detect?

Answer: Extrasolar planets orbit a star other than the sun. These planets are very distant from Earth. They are small and dark, and unlike stars, they do not emit visible light. (They only reflect the visible light of their star.) Therefore, extrasolar planets are faint to see. Imaging a planet is extremely difficult because it gets lost in the glare of its much brighter and larger host star.

Q2: What is the “habitable zone”?

Answer: The habitable zone is an area around a star where liquid water can exist on the surface of an Earth-like planet. For hot stars, this zone is farther away from the star than it is for cooler stars.

Q3: Why do you think NASA’s Kepler spacecraft has been searching for an Earth-like planet that resides in the “habitable zone” of its parent star?

Answer: Earth’s distance from the sun is “just right” for liquid water to exist on its surface. It is not too hot (as it would be if Earth orbited closer to the sun) and not too cold (as it would be if it orbited too far from the sun). This means that any extrasolar planet in the habitable zone of its parent star could have liquid water on its surface. Since all of life as we know it relies on liquid water, scientists think that a primary key to finding life on other worlds lies in detecting liquid water on them.

Continued …
Astronomy
Astronomy is the study of the universe and the celestial bodies that reside in it, including their composition, history, location, and motion.

Atmosphere
The layer of gases surrounding the surface of a planet, moon, or star.

Chemistry for life
The building blocks that enable life to form and to sustain itself. Life as we know it requires a source of energy, organic (carbon-based) compounds, and water. Scientists believe that atmospheric detection of water, oxygen, methane, carbon dioxide, and other compounds can signal the possibility of life on a planet.

Extrasolar planet (Exoplanet)
A planet that orbits a star other than the sun.

Galaxy
A collection of stars, gas, and dust bound together by gravity. The smallest galaxies may contain only a few hundred thousand stars, while the largest galaxies have thousands of billions of stars. The Milky Way galaxy contains our solar system. Galaxies are classified or grouped by their shape. Round or oval galaxies are elliptical galaxies, and those showing a pinwheel structure are spiral galaxies. All others are called irregular because they do not resemble elliptical or spiral galaxies.

Habitable zone
A region around a star where planets with liquid water may be present. A planet on the near edge of the habitable zone would have a surface temperature slightly lower than the boiling point of water. A planet on the distant edge of the habitable zone would have a surface temperature slightly higher than the freezing point of water.

Milky Way
The Milky Way, a spiral galaxy, is the home of Earth. The Milky Way contains more than 100 billion stars and has a diameter of 100,000 light-years.
Nebula(e)
A cloud of gas and dust located between stars and/or surrounding stars. Nebulae are often places where stars form.

Spectrograph (Spectrometer/spectroscope)
An instrument that spreads electromagnetic radiation into its component frequencies and wavelengths for detailed study. A spectrograph is similar to a prism, which spreads white light into a continuous rainbow.

Education Standards

Common Core Standards for English Language Arts
[http://www.corestandards.org/ELA-Literacy/CCRA/R/]

College and Career Readiness Anchor Standard for Reading
CCSS.ELA-Literacy.CCRA.R.10
Read and comprehend complex literary and informational texts independently and proficiently.

SEE MORE Hubble images and read more Star Witness news stories at Amazing Space, NASA's award-winning educational website for K–12 students and teachers.