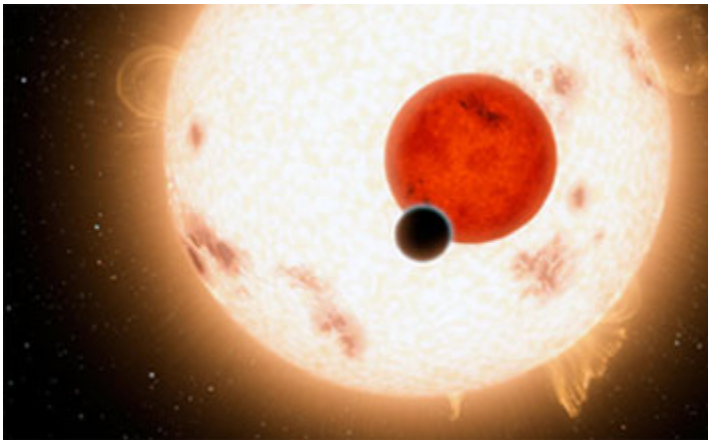
In Our Galaxy, Far, Far Away

NASA Announces the Discovery of a Planet That Orbits Two Stars, But There May Be More ...

In the film *Star Wars: Episode IV —A New Hope*, a future, Jedi named Luke Skywalker watched as two suns set on his home planet, Tatooine. When that film was made some 30 years ago, the existence of a planet with two stars was pure science fiction. Now, astronomers say, it's a scientific fact.



NASA/JPL

On September 15,2011, NASA, the U.S. space agency, announced the discovery of Kepler-16b, a circumbinary planet, or a planet in cumbinary the orbit of two stars. Scientists had previously discovered a few other objects orbiting two stars, but Kepler-16b is the first confirmed planet.

"It's the best example we have of a Tatooine-like world from *Star Wars*," says Nick Gautier, a scientist at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "Now we don't expect Luke Skywalker or anything else to be living on Kepler-16b, but if you could visit there, you would see a sky with two suns just like Luke did."

Star Power

The discovery was made by the Kepler space telescope, which is on a mission to find Earthlike exoplanets—planets in orbit around stars other than the sun. Kepler-16b is the 21st confirmed planet that Kepler has detected since its launch in March 2009.

Lucas Film/20th Century Fox/The Kobol Collection
Luke Skywalker watches a double sunset on his home planet of Tatooine.

Kepler-16b's star system is located between the constellations Cygnus and Lyra, about 200 light-years from Earth. A light-year equals the distance light travels through space in a single year, or about 5.9 trillion miles. The planet is about the size of Saturn, but, because it's gaseous, scientists don't believe it to be habitable.

Although it has two stars, Kepler-16b is probably much colder than Earth because neither star is as powerful as Earth's sun. One star is 69 percent of the mass of the sun. The other is only 20 percent of the mass of the sun. The two stars—together called a binary star—orbit around a common center. They cross paths every 41 days. The planet orbits around both stars every 229 days.

"We have two stars dancing around each other, and in our line of sight, they eclipse each other," says Laurance Doyle, principal investigator for the SETI (Search for Extraterrestrial Intelligence) Institute in Mountain View, Calif. "Then we have this exquisite little pirouette of the planet going around both of them."

The Light Stuff

Scientists are doing much more than admiring the fancy footwork of this dance in space.

EADS Astrium/Corbis
This artist's rendering shows the Kepler space telescope. Kepler has the largest camera ever launched into space.

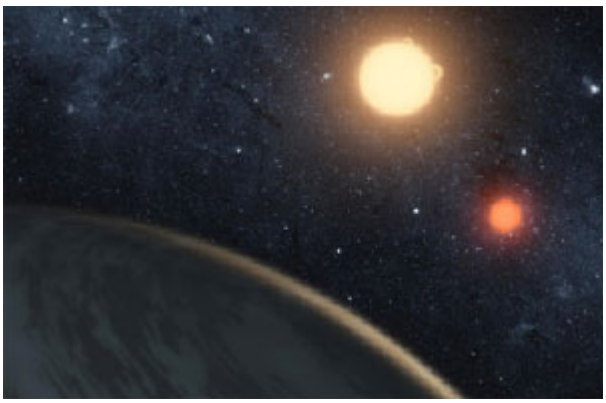
"One way to find exoplanets is to find stars whose planets orbit so they cross in front of the star visible from Earth," says Gautier. The Kepler telescope monitors the brightness of stars, he explains. When a planet crosses in front of a star during an eclipse, it dims some of the star's light for a few hours. By analyzing the changes in light, scientists can accurately determine the size and mass of the planet.

Astronomers hope that further study of binary star systems will help shed light on how planets are formed. "There are as many binary stars as single stars and over 2,000 eclipsing binary stars within Kepler's line of view," says Gautier. "So this could be very common."

Looking For Life

Kepler's main mission, however, is to find Earth-sized planets that are the right distance from a star to have a livable temperature. In February,2011, NASA announced the discovery of 1,235 possible exoplanets. Now the challenge is to find one that could potentially support life.

To date, Kepler has detected large gaseous planets like Jupiter that, because of their distance from their respective stars, would be as hot as Mercury. The telescope also has spied gas planets scope similar in size to Neptune in close orbit around stars. Kepler has even found rogue planets, planet-sized objects that appear to have broken free from the gravitational force of their stars so that they are no longer in orbit.



NASA/JPL
An artist's rendering shows Kepler-16b, the first known circumbinary planet.

The discovery of Kepler-16b opens up a whole new world of possibilities.

"This is an example of another planetary system. A completely different type that we've never seen before," says Doyle. "Nobody's ever seen a place like this before—with one exception. I seem to remember seeing a place like this before about 30 years ago [when *Star Wars* premiered] in a galaxy far, far away."

Name: _____ Date: _____

1. What fictional planet does the writer compare Kepler-16b to?

A Cygnus
B Tatooine
C Lyra
D Pluto

2. How does the author describe Kepler-16b?

A as a gaseous planet about the size of Saturn
B as a planet probably much warmer than Earth
C as a moon that crosses the path of several stars
D as a rocky planet that orbits two stars

3. Which of the following conclusions about the Kepler space telescope is supported by the passage?

A The telescope will most likely discover more planets.
B Kepler-16b is the last planet the telescope will discover.
C The telescope will soon find that Kepler-16b supports life.
D NASA will stop searching for planets with the telescope.

4. Read this sentence from the passage: "The planet is about the size of Saturn, but, because it's gaseous, scientists don't believe it to be habitable."

In this sentence, the word **habitable** means

A covered with holes
B suitable to live on
C carefully observed
D growing in size

5. Which statement best describes the main idea of the passage?

A NASA recently announced the discovery of a circumbinary planet.
B Kepler-16b's star system is located about 200 light-years from Earth.
C Scientist Nick Gautier is studying exoplanets to learn how planets form.
D The Kepler space telescope is on a mission to find Earthlike exoplanets.

6. What is a light-year?

_____

_____

_____

7. How might Laurance Doyle, principal investigator for the SETI Institute, have felt when he learned of the discovery of Kepler-16b? How do you know?

_____

_____

_____

8. The question below is an incomplete sentence. Choose the word that best completes the sentence.

Rogue planets are no longer in orbit _____ they have broken free from the gravitational force of their stars.

A before
B however
C although
D because

9. Answer the following questions based on the sentence below.

Scientists analyze the changes in a star's light to accurately determine the size and mass of a planet orbiting that star.

Who? _____

(do) What? analyze the changes in a star's light

Why? _____

10. **Vocabulary Word**: eclipse: the partial or total blocking of the light of one planet, star, or moon by another.

Use the vocabulary word in a sentence: _____

_____

_____

Teacher Guide & Answers

Passage Reading Level: Lexile 1120

Featured Text Structure: Descriptive – the writer explains, defines, or illustrates a concept or topic

Passage Summary: "In Our Galaxy, Far, Far Away" describes NASA's recent discovery of a planet that orbits two stars.

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- **B** **Tatooine**
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6. What is a light-year?

Suggested answer: A light-year is the distance light travels through space in a single year, or about 5.9 trillion miles. [paragraph 5]

7. How might Laurance Doyle, principal investigator for the SETI Institute, have felt when he learned of the discovery of Kepler-16b? How do you know?

Suggested answer: Doyle was probably very excited about the discovery because it was the first confirmed planet orbiting two stars. [paragraph 2] He is quoted as saying, "This is an example of another planetary system. A completely different type that we've never seen before."

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Use the vocabulary word in a sentence: answers may vary.