Solar Systems

Name: Date:

Space mission to a distant solar system

It's the year 2148 and a group of astronauts has embarked on a journey to a distant solar system. Listen to their first radio transmission that they send to the space agency.

Audio Content

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https://to-teach.ai/worksheet/R3k7SLSpapQsu1Y6Jfhe

Notes

Have you ever heard of the solar system that is being reported on? What do you find particularly exciting about the report?

The solar system

Read the following text about the solar system and answer the questions.

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51 Pegasi System

The 51 Pegasi system is an intriguing solar system located approximately 50 light-years away from Earth, in the constellation Pegasus. This system is particularly famous because it was the first discovered system to contain an exoplanet orbiting a star similar to our Sun, marking a milestone in the study of planets beyond our own solar system.

At the center of the 51 Pegasi system is the star known as 51 Pegasi, sometimes referred to as 51 Peg. This star is very similar to our Sun, classified as a G-type main-sequence star. It has roughly the same size and mass as the Sun, which makes it a particularly interesting object of study for astronomers. With a surface temperature close to that of our own star, 51 Pegasi provides a familiar backdrop for the study of its planets.

The most noteworthy planet in this system is 51 Pegasi b, the first exoplanet ever discovered around a Sun-like star. This discovery, made in 1995, was groundbreaking and opened the door to the field of exoplanet studies. 51 Pegasi b is a gas giant, similar to Jupiter, but it orbits much closer to its star, about 8 million kilometers away, which is closer than Mercury's distance from the Sun. Because of its proximity to the star, 51 Pegasi b is classified as a "hot Jupiter," experiencing extremely high temperatures.

The size of the 51 Pegasi system is compact, especially compared to our solar system. The planet's close orbit around its star is much tighter than the orbits of the planets in our own solar system. This compactness is a characteristic feature of many exoplanetary systems, which often have planets orbiting closer to their stars than those in our solar system.

Despite the differences in size and orbital distances, the 51 Pegasi system shares some similarities with our solar system, mainly due to the star's similarity to the Sun. This resemblance has made the system a crucial point of reference in understanding how common solar systems like ours might be in the galaxy.

One of the most fascinating aspects of the 51 Pegasi system is its role in advancing our understanding of planetary systems beyond our own. The discovery of 51 Pegasi b was a pivotal moment in astronomy, proving that planets orbiting other stars are not only possible but likely common throughout the universe. It has since led to the discovery of thousands of exoplanets, expanding our knowledge of the cosmos and fueling the search for life beyond Earth.

In summary, the 51 Pegasi system is a landmark in the study of planetary systems. Its Sun-like star and the discovery of the first "hot Jupiter" exoplanet make it a vital area of interest, showing us that planets can exist in forms and arrangements beyond those found in our own solar system.

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Choose the correct answer for each question.

What is the significance of 51 Pegasi in the study of exoplanets?

- ○ It is the only known system with Earth-like planets.
- ○ It is the first system with a star similar to our Sun found hosting an exoplanet.
- ○ It contains the largest exoplanet discovered.
- ○ It was the first system with multiple exoplanets discovered.

How does 51 Pegasi b differ from Jupiter in terms of its orbit?

- ○ 51 Pegasi b has a more elliptical orbit than Jupiter.
- ○ 51 Pegasi b orbits farther from its star than Jupiter does from the Sun.
- ○ 51 Pegasi b does not orbit a star.
- ○ 51 Pegasi b orbits much closer to its star than Jupiter does to the Sun.

Why is 51 Pegasi considered an important reference point in astronomy?

- ○ Because it contains multiple Earth-like planets. ○ Due to its unique star formation process.
- ○ Due to its Sun-like star and the presence of the first discovered 'hot Jupiter'.
- ○ Because it is the largest known exoplanet system.

What characteristic of 51 Pegasi b classifies it as a 'hot Jupiter'?

- ○ Its rapid rotation speed. ○ Its high atmospheric pressure. ○ Its large size similar to Jupiter.
- ○ Its extremely close proximity to its star causing high temperatures.

What does the discovery of 51 Pegasi b suggest about planets orbiting stars?

- ○ Planets orbiting stars are only found in the Pegasus constellation.
- ○ Planets orbiting stars are likely common throughout the universe.
- ○ Planets orbiting stars are only gaseous. ○ Planets orbiting stars are rare occurrences.

How does the 51 Pegasi system's size compare to our solar system?

- ○ It is exactly the same size as our solar system. ○ It has planets orbiting at random distances.
- ○ It is more spread out than our solar system.
- ○ It is more compact, with closer orbits than our solar system.

Why is the star 51 Pegasi particularly interesting to astronomers?

- ○ It is very similar in size and mass to our Sun.
- ○ It has a higher temperature than our Sun.
- ○ It is the oldest star discovered to date.
- ○ It has a unique color not found in other stars.

What impact did the discovery of 51 Pegasi b have on astronomy?

- ○ It opened the door to the field of exoplanet studies.
- ○ It refuted the existence of planets outside our solar system.
- ○ It demonstrated that stars cannot host planets.
- ○ It confirmed that all exoplanets are similar to Earth.

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Explain why the discovery of 51 Pegasi b was significant in the field of astronomy.

Describe the characteristics that make 51 Pegasi b a 'hot Jupiter'.

The crew continues their journey

Listen to another radio message from the astronaut crew on their mission in the distant solar system.

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