Finding Our Place

Compare the tools scientists use to locate our solar system.

E.6.8.3 "Evaluate modern techniques used to explore our solar system's position in the universe."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the names of three tools, number one finding from each tool, and circle a limit of each tool so you can compare their evidence.

Where Are We?

1. On a clear night, the Milky Way looks like a pale band across the sky. That band is part of our galaxy, a vast disk of stars, gas, and dust. Our solar system sits inside the disk, so we cannot take a picture of the whole galaxy from outside. The James Webb Space Telescope can observe distant galaxies and show that our galaxy is one among many. But pictures of other galaxies cannot pinpoint where our solar system lies within the Milky Way.

2. Gaia, a space telescope, tracks stars in our own galaxy. As Gaia travels around the Sun, its viewpoint changes. Nearby stars then seem to shift against more distant objects. Gaia measures this tiny apparent shift, called parallax, to calculate distances to stars. With many distances, scientists build a three-dimensional map of part of the Milky Way and place our solar system in it. This method works best for stars whose shifts can be measured clearly. Dust and great distance make some stars hard to measure.

3. Radio telescopes add another clue. They detect radio waves from hydrogen gas in the Milky Way. These waves can pass through dust that blocks visible light. By measuring the gas's radio signals in different directions, scientists can trace parts of the galaxy's spiral arms. Together with star distances, this evidence places our solar system in the Orion Spur, a small arm segment far from the galactic center. Radio signals reveal gas, not the exact distance to every star, so scientists compare radio maps with Gaia's star map instead of trusting either alone.

2 ANSWER WITH EVIDENCE

Use the passage

1. A scientist wants to find distances to nearby stars. Why is Gaia a better choice than Webb's pictures of other galaxies? Give one limit of Gaia's method.

2. Dust blocks the view of part of the Milky Way. Which tool could help scientists study that area, and what could it reveal?

3. Why are Webb's pictures of distant galaxies useful but not enough to locate our solar system within the Milky Way?

4. Why do scientists compare Gaia's star map with radio maps instead of using either map alone?

3 YOUR TURN

Your own words

Plan a three-stop museum tour using Webb, Gaia, and radio telescopes in any order. In four sentences, tell what visitors learn at each stop and explain why the first stop cannot answer every question about our location.

ANSWER KEY

Finding Our Place

GRADE 6 · E.6.8.3

PART 1 · READ AND MARK

Underline the names of three tools, number one finding from each tool, and circle a limit of each tool so you can compare their evidence. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	A scientist wants to find distances to nearby stars. Why is Gaia a better choice than Webb's pictures of other galaxies? Give one limit of Gaia's method.	**Gaia measures apparent shifts to calculate star distances, while pictures of other galaxies cannot pinpoint our location in the Milky Way. Dust or great distance makes some stars hard for Gaia to measure.**
2	Dust blocks the view of part of the Milky Way. Which tool could help scientists study that area, and what could it reveal?	**Radio telescopes can detect waves from hydrogen gas through dust and help trace parts of the spiral arms.**
3	Why are Webb's pictures of distant galaxies useful but not enough to locate our solar system within the Milky Way?	**They show that the Milky Way is one among many galaxies, but they do not pinpoint our location inside it.**
4	Why do scientists compare Gaia's star map with radio maps instead of using either map alone?	**Gaia measures distances to stars it can observe clearly, while radio telescopes trace gas through dust. Neither tool alone shows every star's position.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

First, Webb shows visitors distant galaxies, revealing that the Milky Way is one galaxy among many. Webb cannot show where our solar system lies inside the Milky Way. Next, Gaia measures star distances using shifts seen from its changing viewpoint and helps map our region. Finally, radio telescopes detect gas through dust and help trace the Orion Spur, placing our solar system within the galaxy.

Accept any tour order that accurately describes a finding from each tool and a limit of the first tool. For question 4, students should identify different evidence from the two maps, not claim that either map shows every star.