Cosmic Address

Trace how astronomical bodies fit into larger systems.

SC.8.E.5.3 "Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each mention of *planet*, *solar system*, *galaxy*, and *universe*, then number these levels 1 through 4 from smallest to largest to show the hierarchy.

From Earth to the Universe

1. Earth's cosmic address begins in the solar system, a system centered on the Sun. Eight planets orbit the Sun, along with dwarf planets, moons, asteroids, comets, and small rocky or icy pieces. The inner planets, including Earth, are relatively small and rocky. Farther from the Sun are giant planets. Jupiter and Saturn contain mostly hydrogen and helium, while Uranus and Neptune contain large amounts of water, ammonia, and methane in fluid-like forms beneath their atmospheres. These differences show that bodies in one solar system can vary in size, distance, and composition.

2. The solar system is one of hundreds of billions of star systems in the Milky Way galaxy. A galaxy is a vast collection of stars, stellar systems, gas, dust, and other material held together by gravity. The Milky Way's disk is about 100,000 light-years wide, and the Sun lies about 26,000 light-years from its center. In comparison, the nearest star system, Alpha Centauri, is about 4.3 light-years from the Sun. A galaxy therefore spans distances far beyond a solar system.

3. Beyond the Milky Way are many other galaxies. The observable universe contains galaxies grouped into clusters and larger groups, plus space, radiation, and matter between galaxies. It is not a single galaxy or a giant solar system. Light from some distant galaxies has traveled for billions of years before reaching Earth, so astronomers observe them as they were long ago. Size and distance help organize the hierarchy: a planet belongs to a solar system, a solar system belongs to a galaxy, and a galaxy is one part of the universe.

2 ANSWER WITH EVIDENCE

Use the passage

1. Write Earth's hierarchy from the planet level through the universe level.

2. Use composition to distinguish the inner planets from the giant planets named in the passage.

3. The Sun is about 26,000 light-years from the Milky Way's center, while Alpha Centauri is about 4.3 light-years from the Sun. About how many times farther is the Milky Way's center from the Sun than Alpha Centauri is?

4. How is a galaxy different from a planet in what it contains?

3 YOUR TURN

Your own words

Choose an astronomical body not named in the passage, such as a moon, asteroid, or comet. Complete the table to place it in the hierarchy and give one accurate detail about size, distance, composition, or contents in each row.

LEVEL IN HIERARCHY	EXAMPLE OR GROUP	CONNECTION OR SCALE DETAIL	COMPOSITION OR CONTENTS DETAIL

ANSWER KEY

Cosmic Address

GRADE 8 · SC.8.E.5.3

PART 1 · READ AND MARK

Underline each mention of *planet*, *solar system*, *galaxy*, and *universe*, then number these levels 1 through 4 from smallest to largest to show the hierarchy. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Write Earth's hierarchy from the planet level through the universe level.	**Earth, solar system, Milky Way galaxy, universe.**
2	Use composition to distinguish the inner planets from the giant planets named in the passage.	**The inner planets are relatively small and rocky. Jupiter and Saturn are mostly hydrogen and helium, while Uranus and Neptune contain large amounts of water, ammonia, and methane in fluid-like forms.**
3	The Sun is about 26,000 light-years from the Milky Way's center, while Alpha Centauri is about 4.3 light-years from the Sun. About how many times farther is the Milky Way's center from the Sun than Alpha Centauri is?	**About 6,000 times farther, because 26,000 divided by 4.3 is about 6,000.**
4	How is a galaxy different from a planet in what it contains?	**A galaxy contains stars, stellar systems, gas, dust, and other material. A planet is one body in a solar system, and planets may be rocky or may contain gas and fluid-like materials.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

LEVEL IN HIERARCHY	EXAMPLE OR GROUP	CONNECTION OR SCALE DETAIL	COMPOSITION OR CONTENTS DETAIL
Astronomical body	Europa, a moon	Orbits Jupiter in the solar system	Mostly water ice with rock
Solar system	Solar system	Centered on the Sun	Includes rocky, gaseous, and icy bodies
Galaxy	Milky Way galaxy	About 100,000 light-years wide	Stars, gas, dust, and other material
Universe	Observable universe	Contains galaxy clusters	Galaxies, matter, radiation, and space

Accept equivalent hierarchy wording when the selected body is correctly placed within a solar system, galaxy, and universe. Open responses should use accurate relationships and include a valid detail in every row.