Changing Cosmic Views

Trace how observations changed our picture of the universe.

6.2 "Evaluate information to compare and contrast past and current views about the structure of the universe and show how these views have changed over time."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Number the Earth-centered, Sun-centered, and present-day views 1 to 3 in the order they appeared, then underline observations that helped scientists change their views.

Where Are We in the Universe?

1. Imagine watching the night sky from a field with no city lights. Stars seem to turn around you, while the ground feels still. For centuries, many scholars described a universe with Earth at its center. In a model developed by Ptolemy, the Sun, Moon, and planets traveled around Earth, and stars were fixed to a distant sphere. This model could predict many positions in the sky, but its paths for planets became complicated. A planet sometimes appears to move backward against the stars, a pattern called retrograde motion.

2. In the 1500s, Nicolaus Copernicus proposed that Earth and the other planets orbit the Sun. Earth also spins, making the stars seem to move across the sky each night. This model explained apparent backward motion as a result of planets moving at different speeds around the Sun. Later, Galileo used a telescope to see moons orbiting Jupiter and a full set of phases of Venus. These observations challenged the claim that everything circles Earth. Johannes Kepler then found that planets follow oval-shaped paths called ellipses, not perfect circles.

3. A Sun-centered solar system does not mean the Sun is the center of everything. The Sun is one star in the Milky Way galaxy. In the 1900s, astronomers found that some fuzzy patches of light were separate galaxies far beyond the Milky Way. Before that, many scientists thought the Milky Way contained the entire universe. Light from many distant galaxies is shifted toward red, and more distant galaxies generally show greater shifts. This pattern provides evidence that space is expanding. Scientists revised their picture when new observations no longer fit older models.

2 ANSWER WITH EVIDENCE

Use the passage

1. How did Copernicus explain the stars' nightly movement differently from scholars who placed Earth at the center?

2. How did Galileo's observation of Jupiter's moons challenge the Earth-centered view?

3. What did Kepler change about the paths of planets in the Sun-centered model?

4. How did the discovery of other galaxies change the view that the Milky Way held the whole universe?

3 YOUR TURN

Your own words

A classmate says, "Copernicus put the Sun at the center, so the Sun must be the center of the whole universe." Write exactly four sentences that correct this claim. Compare the Earth-centered view, Copernicus's view, and today's view, and explain how an observation helped change one of them.

ANSWER KEY

Changing Cosmic Views

GRADE 6 · 6.2

PART 1 · READ AND MARK

Number the Earth-centered, Sun-centered, and present-day views 1 to 3 in the order they appeared, then underline observations that helped scientists change their views. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How did Copernicus explain the stars' nightly movement differently from scholars who placed Earth at the center?	**In the Earth-centered view, stars moved around a still Earth. Copernicus said Earth spins, making the stars seem to move.**
2	How did Galileo's observation of Jupiter's moons challenge the Earth-centered view?	**The moons orbit Jupiter, showing that not everything circles Earth.**
3	What did Kepler change about the paths of planets in the Sun-centered model?	**Kepler found that planets follow ellipses rather than perfect circles.**
4	How did the discovery of other galaxies change the view that the Milky Way held the whole universe?	**It showed that galaxies exist far beyond the Milky Way, so the Milky Way is not the whole universe.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

An early model placed Earth at the center of the universe. Copernicus placed the Sun at the center of the planets' paths, but that does not make it the center of the whole universe. Galileo saw moons orbiting Jupiter, which challenged the claim that everything circles Earth. Today we know the Sun is one star in the Milky Way, with other galaxies far beyond it.

Accept responses that distinguish a Sun-centered solar system from the universe as a whole. The observation may instead be Venus's phases, other galaxies, or the redshift pattern if its effect on a view is explained accurately.