Centers of the Sky

Compare how historical models explained the motions of objects in space.

SC.8.E.5.8 "Compare various historical models of the Solar System, including geocentric and heliocentric."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline statements that describe what moves in the geocentric model, and circle statements that describe what moves in the heliocentric model. Number 1 and 2 beside two pieces of evidence that led scientists to revise models.

Changing Views of the Solar System

(1) Long before telescopes, many Greek thinkers used a geocentric model to explain the sky. In this model, Earth stayed motionless at the center. The Moon, Sun, planets, and stars traveled around Earth. This matched everyday observations: the Sun seemed to cross the sky each day, while the ground felt still. Later astronomers such as Ptolemy added circles within circles, called epicycles, to better predict changing planet positions. A geocentric model could make useful predictions, even though its central idea was not correct.

(2) In 1543, Nicolaus Copernicus described a heliocentric model with the Sun near the center of the solar system. Earth became a moving planet. It rotates once each day, which helps explain the daily motion of the sky, and it travels around the Sun once each year. The other known planets also orbit the Sun. Copernicus still used circular paths, but placing the Sun near the center made the backward-looking motion of planets easier to explain than it was in the geocentric model.

(3) New evidence and improved mathematics changed the heliocentric model. Galileo observed moons orbiting Jupiter, showing that not everything circled Earth. He also observed phases of Venus that fit heliocentric explanations better than the Ptolemaic geocentric arrangement. Johannes Kepler later showed that planets move in elliptical, not perfectly circular, paths around the Sun. Today, scientists compare models by asking how well each explains observations and predicts results. Models can be useful at one time, then revised when stronger evidence appears.

2 ANSWER WITH EVIDENCE

Use the passage

1. What did the geocentric and heliocentric models each place near the center, and what did each say about Earth's motion?

2. How did each model explain the daily motion of the Sun across the sky?

3. Identify two observations Galileo made that challenged the idea that everything moved around Earth.

4. How did Kepler revise Copernicus's heliocentric model, and what does this show about scientific models?

3 YOUR TURN

Your own words

Create two labeled sketches. In the left panel, show the geocentric model. In the right panel, show the heliocentric model. Use arrows to show motion, then write 2 to 3 sentences comparing how Earth moves in the two models.

ANSWER KEY

Centers of the Sky

GRADE 8 · SC.8.E.5.8

PART 1 · READ AND MARK

Underline statements that describe what moves in the geocentric model, and circle statements that describe what moves in the heliocentric model. Number 1 and 2 beside two pieces of evidence that led scientists to revise models. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What did the geocentric and heliocentric models each place near the center, and what did each say about Earth's motion?	**The geocentric model placed motionless Earth at the center. The heliocentric model placed the Sun near the center and described Earth as a moving planet that rotates and orbits the Sun.**
2	How did each model explain the daily motion of the Sun across the sky?	**The geocentric model said the Sun traveled around Earth. The heliocentric model explained the daily motion of the sky by Earth's daily rotation.**
3	Identify two observations Galileo made that challenged the idea that everything moved around Earth.	**Galileo observed moons orbiting Jupiter and phases of Venus.**
4	How did Kepler revise Copernicus's heliocentric model, and what does this show about scientific models?	**Kepler showed that planets travel in elliptical rather than perfectly circular paths around the Sun. This shows that models can be revised when new evidence or stronger mathematics appears.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Left panel labels: Earth at center; Sun and Mars orbit Earth. Right panel labels: Sun near center; Earth and Mars orbit Sun. In the geocentric model, Earth stays motionless while the Sun and planets move around it. In the heliocentric model, Earth is a moving planet that orbits the Sun.

Accept equivalent comparisons that correctly identify Earth as fixed in the geocentric model and moving in the heliocentric model. For the sketches, accept any clearly labeled objects and arrows that accurately show the center and orbital motion of each model.