

Evidence Changes Models

Trace how new observations reshape scientific explanations.

S6E1.a "Ask questions to determine changes in models of Earth's position in the solar system, and origins of the universe as evidence that scientific theories change with the addition of new information."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each new observation or finding, circle the model or theory it affected, and number the questions scientists asked or could ask, so you can trace how evidence changed scientific ideas.

When New Evidence Arrives

- ① For centuries, many Europeans used a geocentric model, placing Earth at the center while the Sun, Moon, planets, and stars moved around it. This model matched what people seemed to see each day. Later, Nicolaus Copernicus proposed a heliocentric model with the Sun near the center and Earth moving around it. His idea raised questions. Why did planets sometimes appear to reverse direction? Could observations and mathematics test which model explained those motions more clearly?
- ② In 1610, Galileo Galilei used a telescope to observe Venus. He saw Venus show a full set of phases, similar to the Moon's changing shapes. The geocentric model used by many people could not explain all of these phases. A model in which Venus orbits the Sun could. Galileo also observed moons orbiting Jupiter, showing that not every object traveled around Earth. These observations gave scientists new evidence to question the older model more carefully.
- ③ Scientists also changed ideas about the universe's origin. In the 1920s, Edwin Hubble found that light from distant galaxies was shifted toward red wavelengths. This showed that many galaxies are moving away from one another, so the universe is expanding. Later, scientists detected faint microwave radiation throughout space, called the cosmic microwave background. This new evidence strongly supported the Big Bang theory over competing ideas, such as a universe that had always stayed the same. Scientists continue to question and refine explanations as new evidence appears.

2 ANSWER WITH EVIDENCE Use the passage

1 What question in the first paragraph could help scientists compare the geocentric and heliocentric models?

2 How did Galileo's observations of Venus challenge the geocentric model?

3 Which new finding supported the Big Bang theory, and which competing idea did it challenge?

4 What do the changes in solar system models and ideas about the universe's origin have in common?

3 YOUR TURN Your own words

Write exactly three sentences about an imagined new observation that an old scientific model cannot explain. Describe the evidence, ask a testable question, and explain how repeated results could lead scientists to revise the model.

PART 1 • READ AND MARK

Underline each new observation or finding, circle the model or theory it affected, and number the questions scientists asked or could ask, so you can trace how evidence changed scientific ideas. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What question in the first paragraph could help scientists compare the geocentric and heliocentric models?	Why planets sometimes appear to reverse direction, and which model explains those motions more clearly.
2	How did Galileo's observations of Venus challenge the geocentric model?	Venus showed a full set of phases. The geocentric model could not explain all of those phases, but a model with Venus orbiting the Sun could.
3	Which new finding supported the Big Bang theory, and which competing idea did it challenge?	The detection of the cosmic microwave background supported the Big Bang theory. It challenged the idea that the universe had always stayed the same.
4	What do the changes in solar system models and ideas about the universe's origin have in common?	In both cases, new observations gave scientists evidence to question, revise, or support explanations.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Astronomers observe an exoplanet crossing in front of its star at times that differ from predictions. Does a second planet's gravity cause the timing changes? If repeated measurements support that idea, scientists could revise the model to include another planet.

Accept any plausible observation, a question that could be investigated with evidence, and a clear explanation that results could lead to model revision. The response must contain exactly three sentences.