Ideas in Motion

Trace the people and ideas that reshaped the study of nature.

9-12.WC.40 "Identify the major contributions of individuals associated with the Scientific Revolution, including, but not limited to Copernicus, Kepler, Galileo, Newton, Bacon, and Descartes."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the six scientists' names and circle one contribution linked to each, so you can tell their ideas apart.

How the Heavens Changed

1. Imagine trying to predict where Mars will appear next month using a model that puts Earth at the center of the cosmos. In the sixteenth century, Nicolaus Copernicus proposed a different model: Earth and the other planets orbit the Sun, while Earth also rotates. His model reorganized the heavens, but it still treated planetary paths as circles. Later, Johannes Kepler studied detailed observations of Mars collected by Tycho Brahe. Kepler found that planets travel in ellipses, not perfect circles, and that their speeds change along their paths. The sky could now be described with more accurate mathematical rules.

2. New instruments made the debate harder to ignore. Galileo Galilei used an improved telescope to observe four moons orbiting Jupiter and the changing phases of Venus. Jupiter's moons showed that not everything circles Earth; Venus's phases supported a Sun-centered arrangement over the traditional Earth-centered model. Galileo also studied falling bodies and argued that nature could be investigated through observation and mathematical reasoning. Yet looking through a telescope was only one way to question old claims. Francis Bacon urged investigators to gather observations and conduct experiments before drawing broad conclusions. For Bacon, a claim about nature needed systematic tests rather than trust in ancient authorities.

3. René Descartes emphasized another route: begin with clear principles, then use logical deduction to work out what follows. His emphasis on reason differed from Bacon's stress on evidence gathered through observation and experiment, though later scientists often used both. In the late seventeenth century, Isaac Newton brought mathematical explanation to a new scale. His laws of motion described how forces change the movement of objects, and his law of universal gravitation described attraction between masses. Together, these laws helped explain both a falling apple and the motion of planets. The revolution unfolded through competing ideas, fresh evidence, and new connections.

2 ANSWER WITH EVIDENCE

Use the passage

1. What did Copernicus propose about Earth's place in the cosmos, and how did Kepler change the description of planetary paths?

2. Identify two things Galileo saw through his telescope and explain what each showed about the traditional Earth-centered model.

3. How did Bacon's and Descartes's approaches to investigating nature differ?

4. Which contributions by Newton helped explain both falling objects and moving planets?

3 YOUR TURN

Your own words

A museum visitor claims the Scientific Revolution was one sudden discovery by one person. Write a 75 to 95 word label challenging that claim. Name at least three people, connect at least two of their contributions, and contrast two approaches or discoveries.

ANSWER KEY

Ideas in Motion

HIGH SCHOOL · 9-12.WC.40

PART 1 · READ AND MARK

Underline the six scientists' names and circle one contribution linked to each, so you can tell their ideas apart. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What did Copernicus propose about Earth's place in the cosmos, and how did Kepler change the description of planetary paths?	**Copernicus proposed that Earth and the other planets orbit the Sun. Kepler showed that planetary paths are ellipses rather than circles.**
2	Identify two things Galileo saw through his telescope and explain what each showed about the traditional Earth-centered model.	**Moons orbiting Jupiter showed that not everything circles Earth. Venus's phases supported a Sun-centered arrangement over the traditional Earth-centered model.**
3	How did Bacon's and Descartes's approaches to investigating nature differ?	**Bacon stressed observations and experiments before broad conclusions. Descartes stressed deduction from clear principles.**
4	Which contributions by Newton helped explain both falling objects and moving planets?	**Newton's laws of motion described how forces change movement, and his law of universal gravitation described attraction between masses.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Scientific change was not a single flash of insight. Copernicus placed Earth among planets orbiting the Sun, but his model kept circular orbits. Kepler used measurements of Mars to show that planetary paths are ellipses, making predictions more accurate. Galileo's observations of Venus offered evidence for a Sun-centered arrangement. Bacon urged testing ideas through observations and experiments, while Descartes stressed deduction from clear principles. Their approaches differed, yet both pushed thinkers to examine how claims about nature could be justified.

Accept accurate paraphrases of each contribution. For the museum label, check the word count, three named people, a clear connection between contributions, and an accurate contrast.