Ideas Across Borders

Trace the people and knowledge behind new ways of studying the universe.

MWH.C.2.4.B "Describe the accomplishments of major figures of the Scientific Revolution (e.g., Nicolaus Copernicus, Galileo Galilei, Isaac Newton) as well as the impact of Islamic and Hindu learning on global scholarship and scientific thought."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each named scholar's accomplishment and circle where the passage describes Hindu or Islamic learning spreading to other regions. Number two places where knowledge from one region helped scholarship in another.

How Knowledge Traveled

1. Imagine trying to predict a planet's position without an easy way to write numbers. Scholars in India developed a decimal place-value system with a symbol for zero. Its numerals and methods spread through the Islamic world, where scholars studied and expanded them. In ninth-century Baghdad, al-Khwarizmi wrote works on calculation using these numerals and on algebra, which offered methods for solving equations. His writings later reached European readers in Latin translation. These tools did not tell astronomers what to believe about the sky. They made complex calculations easier to record, share, and check across regions.

2. Another Islamic scholar, Ibn al-Haytham, investigated light and vision around the eleventh century. He tested ideas about how light behaves rather than relying only on ancient authorities. His work on optics circulated in Latin and influenced European studies of light. Centuries later, Nicolaus Copernicus proposed a sun-centered model of the planetary system in a book published in 1543. In this model, Earth rotates and travels around the sun. Copernicus used mathematics to describe planetary motion. His model challenged the long-standing Earth-centered view, but many people remained unconvinced because they wanted stronger observational evidence.

3. In the early 1600s, Galileo Galilei used a telescope to observe moons circling 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 standard Earth-centered model. Neither observation alone proved that Earth moves. In 1687, Isaac Newton published laws of motion and universal gravitation that explained both falling objects and the motion of planets. His equations connected events on Earth with events in space. Scientific change grew from new observations and arguments, and from mathematical knowledge that had crossed languages and cultures.

2 ANSWER WITH EVIDENCE

Use the passage

1. Describe a Hindu mathematical contribution. How did al-Khwarizmi help this knowledge reach later scholars?

2. How did Ibn al-Haytham study light, and what impact did his work have beyond the Islamic world?

3. Describe Copernicus's model. How did Galileo's observations strengthen the challenge to the Earth-centered view?

4. What did Newton's laws explain, and how did that change the way scientists could study Earth and space?

3 YOUR TURN

Your own words

Write a 70 to 90 word museum label arguing whether the Scientific Revolution was the work of Europe alone. Include one Scientific Revolution figure, specific contributions from both Hindu and Islamic learning, and a connection between these achievements.

Ideas Across Borders

PART 1 · READ AND MARK

Underline each named scholar's accomplishment and circle where the passage describes Hindu or Islamic learning spreading to other regions. Number two places where knowledge from one region helped scholarship in another. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Describe a Hindu mathematical contribution. How did al-Khwarizmi help this knowledge reach later scholars?	**Scholars in India developed a decimal place-value system with a symbol for zero. Al-Khwarizmi wrote about calculation using its numerals, and his writings later reached European readers in Latin.**
2	How did Ibn al-Haytham study light, and what impact did his work have beyond the Islamic world?	**He tested ideas about light rather than relying only on ancient authorities. His work on optics circulated in Latin and influenced European studies of light.**
3	Describe Copernicus's model. How did Galileo's observations strengthen the challenge to the Earth-centered view?	**Copernicus proposed that Earth rotates and travels around the sun. Galileo observed moons circling Jupiter and phases of Venus, evidence against the standard Earth-centered model.**
4	What did Newton's laws explain, and how did that change the way scientists could study Earth and space?	**His laws of motion and universal gravitation explained both falling objects and planetary motion, connecting events on Earth with events in space.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The Scientific Revolution was not the work of Europe alone. Copernicus used mathematics to describe a sun-centered planetary system that challenged the Earth-centered view. Hindu scholars developed a place-value system with zero, and scholars in the Islamic world studied those numerals. Al-Khwarizmi wrote about calculation and algebra; his works later reached Europe in Latin. These shared mathematical tools made complicated calculations easier to record and check. Copernicus's model was his own achievement, but his work belongs in a longer, cross-cultural history of scholarship.

Accept other accurate examples from the passage. Do not require or credit a claim that an earlier scholar directly taught Copernicus, Galileo, or Newton.