Nelson Atkins MUSEUM OF ART

Mapping the Heavens
Art, Astronomy, and Exchange between the Islamic Lands and Europe

Teacher Resource Guide

December 14, 2024 – January 11, 2026

ABOUT THE EXHIBITION

Mapping the Heavens: Art, Astronomy, and Exchange between the Islamic Lands and Europe explores the spread of astronomical and astrological knowledge across Eurasia from the Middle Ages through the 1800s. The books, scientific instruments, and works of art featured in the exhibition demonstrate the exchange that occurred between Europe and the Islamic world as scholars developed tools and techniques for determining time, place, and location using the stars.

They tell a multicultural and multi-faith story of knowledge being preserved, passed on, and advanced in an effort to answer two fundamental questions about humans' place in the universe: ***Where*** are we? ***When*** are we?

View of the exhibition galleries

LEARNING OBJECTIVES

Through the activities outlined in this guide:

- Students will explore texts and objects that contributed to the spread of scientific knowledge across Eurasia.
- Students will consider how cultural exchange among Islamic, Jewish, and Christian scholars helped shape the study of astronomy.
- Students will analyze primary sources from history and draw conclusions about the cultures that produced them.

USING THIS GUIDE

This guide can help educators incorporate *Mapping the Heavens* into their students' learning. In the **Before Your Visit** section of the guide, you will find activities and discussion questions to prepare students to view the exhibition. The **In the Exhibition** section can facilitate exploration within the museum, and the **Extend Your Learning** section provides post-visit suggestions that build on what students have seen. A list of **Suggested Resources** directs you to additional sources of information related to the exhibition's themes.

WHAT TO EXPECT IN THE EXHIBITION

This exhibition is on view in Gallery 203 on the second floor of the Nelson-Atkins building. Entry to the exhibition is free. While docent-led tours of this exhibition are not available, you can include a visit to *Mapping the Heavens* on a scheduled teacher-led school tour. To book a teacher-led tour, visit ***nelson-atkins.org/learn/field-trips***. There are 16 objects on view in this exhibition, and they are displayed in a single gallery. To avoid overcrowding, groups of more than 15 should be subdivided and take turns visiting the exhibition.

HISTORICAL BACKGROUND

Detail from *Ulugh Beg with ladies of his harem and retainers*, 1425-1450. National Museum of Asian Art.

During the Early Middle Ages (500s–1200s C.E.), Muslim scholars preserved astronomical and astrological texts from the ancient world while also making original observations and calculations that advanced scientific knowledge of the cosmos. Islamic Spain, called Al-Andalus, served as an especially important center of astronomical translation and innovation, though scholars from other parts of the Islamic world made significant contributions. The 9th-century Syrian astronomer al-Battāni improved on the work of Ptolemy, the Greek scientist whose mathematical model of the universe had served as the foundation of West Asian and European astronomical thought since the 2nd century. In the early 1400s, the Persian astronomer Ulugh Begh further refined Ptolemy's calculations through measurements taken at his observatory in what is now Uzbekistan.

Nicolaus Copernicus. Line engraving. Wellcome Collection

Between the 1400s and the late 1700s, texts from some of the most important Muslim astronomers were translated into European languages, and the introduction of the printing press facilitated the dissemination and exchange of knowledge throughout Europe and the Middle East. Like others of his era, the Polish astronomer Nicolaus Copernicus (1473–1543) drew on both foundational texts and direct observations to introduce new ways of thinking about the universe, including the revolutionary idea that the Earth and planets rotate around the sun. Scientists from Islamic, Jewish, and Christian backgrounds contributed their unique perspectives to the study of the heavens, drawing on the same texts and tools to communicate astronomical knowledge across audiences and cultures.

BEFORE YOUR VISIT

- Invite students to consider where their knowledge of the stars and planets comes from. Discuss: *What resources are available today to help us observe and understand the universe and Earth's place within it? How might your understanding be different if those tools didn't exist?*

- Explain that the scientists featured in *Mapping the Heavens* relied on both direct observations and texts passed down from past astronomers to make sense of the cosmos. Students can look for specific tools and resources they used when they visit the exhibition.

- Make a mind map for the term 'cultural exchange' — what does that term mean to students? What comes to mind when they hear it? Can they think of any examples of cultural exchange that they've studied or encountered? Emphasize that cultural exchange will be a key theme to look for in the *Mapping the Heavens* exhibition.

- Discuss the tools students use to track time and location in their daily lives. Apps, household appliances, paper calendars, maps, and handheld devices are just a few examples that may came up. Then, view the British Museum's video, "How to Use an Astrolabe" and discuss: *What do you think it would be like to use this tool to determine time, date, and location? How would it compare to the tools you use today?*

  Video URL: ***youtu.be/N8oWGwcdFmA?feature=shared***

IN THE EXHIBITION

- Just outside the entrance to the exhibition, you'll find a hands-on station where students can try using a replica astrolabe. Invite students to try the tool — what are their impressions of using the instrument to tell time?

Muhammad ibn al-Fattuh al-Khama'iri, Spain. *Astrolabe*, 1236/7. Brass, 10 x 7.5 x 1.4 inches. On Loan From the Adler Planetarium, Chicago.

- Next to the astrolabe model is a manuscript illustration showing an Iranian scholar using an astrolabe to predict the best time to attack an enemy army. Discuss: *What might it be like to use an astrolabe in the field during wartime?*
- Encourage students to read the labels next to the objects in the exhibition. Challenge them to find three reasons why people from various religious backgrounds might need to accurately identify a given date, time, or location.
- Have students choose an illustration from one of the texts on display and examine it closely, considering:

A Sage Advises Khusraw When to Attack, Persian, late 15th century (Detail). Ink, opaque watercolor, and gold on paper, 11 5/8 x 7 inches. Purchase: William Rockhill Nelson Trust, 47-44/1.

  - What words or symbols do you see? Can you tell what language is used in and/or around the illustration?
  - What shapes does it contain?
  - Is it meant to represent something from the physical world, or does it illustrate a mathematical concept?
  - If people are shown in it, what are they doing and who might they be?
  - Read the label — what is the illustration meant to show?
- Invite students to watch the video on view in the exhibition gallery and discuss: *Did anything surprise you about Kansas City's connection to Islamic Spain? Where else might we find evidence of cultural exchange in our city or our daily lives?*

EXTEND YOUR LEARNING

- Encourage students to learn more about the role Muslim scholars played in advancing scientific knowledge. Some books and web sources they could use for their research are listed in the **Suggested Resources** section of this guide.
- Have students research the history of one of the tools they use to tell time or location. How was it developed and popularized? What cultures or individuals were involved in its development?
- Explore other works of art that are representative of cultural exchange. For each one, discuss: *What cultures were associated with this object? What might this object tell us about the relationship between those cultures at the time it was made?* Suggested works of art from the Nelson-Atkins:

- Gerrit Dou (Dutch, 1613-1675), *Self-Portrait at Age 50*, 1663. Oil on cradled mahogany panel, 21 1/2 x 15 15/16 inches. Purchase: William Rockhill Nelson Trust, 32-77.
- *Central Asian Caravan Woman Rousing Her Camel While Nursing*, Chinese, 8th century C.E. Earthenware with unfired coloring, 16 x 18 x 11 inches. Purchase: the Richard J. Stern Foundation for the Arts –Commerce Bank, Trustee, and Hall Family Foundation Endowment for the Oriental Department, 2002.7.
- *Coat*, Ojibwa, Ontario, Canada, about 1789. Native tanned leather, rawhide, native pigment, natural and dyed porcupine quills, glass beads, and dyed animal hair, 49 x 27 inches. Gift of Ned Jalbert in honor of the 75th anniversary of The Nelson-Atkins Museum of Art and funds from the exchange of William Rockhill Nelson Trust properties, 2008.1.

GLOSSARY OF TERMS

Al-Andalus	The name for the parts of the Iberian Peninsula (in present-day Spain and Portugal) under Muslim rule between the 700s and 1400s C.E.
Astrolabe	An astronomical instrument that could be used for a variety of purposes, including telling time and date, calculating heights and distances, and navigation via star positions
Astrology	The study of the supposed relationship between the movement of celestial objects and events in human lives
Astronomy	The scientific study of space and the objects and phenomena it contains
Celestial atlas	A collection of maps and charts of the sky, used by astronomers to track the movement of stars and planets
Constellation	A group of stars that is recognized for its resemblance to a known form or figure, such as a character from mythology
Heliocentric	"Sun-centered," a term that describes a model of the solar system in which the sun is assumed to be at the center, with the Earth and other celestial bodies revolving around it
Planisphere	A map that shows a sphere projected onto a flat surface; in astronomy, a planisphere shows a view of the stars and constellations visible from a particular latitude on Earth
Printing Press	A machine that prints texts or pictures using movable type or plates that transfer ink to another surface, such as paper.
Quadrant	A navigational tool that was used to determine the latitude and altitude of a star
Tusi couple	A mathematical model that describes the rotation of a circle inside another circle that is twice its diameter; developed by Persian astronomer Nasir al-Din al-Tusi and used by Nicolaus Copernicus to explain planetary motion
Zodiac	An area of the sky through which the sun, moon, and many planets appear to travel; in astrology, different positions within this area are associated with different attributes that influence human affairs and events on Earth

SUGGESTED RESOURCES

Books

The Light Ages: The Surprising Story of Medieval Science, by Seb Falk, 2020.
A detailed exploration of the state of scientific thought in Europe during the Middle Ages, told from the perspective of a 14th-century English monk. Available in the ERC.

1001 Inventions & Awesome Facts from Muslim Civilization, National Geographic Kids, 2012.
A student-friendly, illustrated guide to the scientific, cultural, and technological achievements of the Islamic world. Available in the ERC.

Web

Finding Our Place in the Cosmos: From Galileo to Sagan and Beyond, Library of Congress, ***loc.gov/collections/finding-our-place-in-the-cosmos-with-carl-sagan***
This collection from the Library of Congress includes digitized primary sources, teaching resources, and articles and essays that address such themes as astronomy in the Islamic world and the Copernican Revolution.

Cultural Exchange in Afro-Eurasia, OER Project, ***oerproject.com/World-History-Origins/Unit-6/Cultural-Exchange-in-Afro-Eurasia***
This open-access instructional unit includes student activities, informational articles, and guiding questions related to scientific and cultural exchange across Afro-Eurasia between 1200 and 1750 C.E.

"Science, Faith, and the Heavens: Astronomy in the Islamic World," Adler Planetarium. Google Arts & Culture, ***g.co/arts/TzeKsVmAx5LwETv97***
View objects from the collection of the Adler Planetarium in this online exhibition that demonstrates the contributions of Islamic scholars to the advancement of astronomy.

EDUCATOR RESOURCE CENTER

This guide was produced by the Educator Resource Center at the Nelson-Atkins. The ERC is available to support educators with a variety of programs and resources. If you are interested in learning more about ways to link museum works with classroom learning, we invite you to connect with the ERC to access:

- Curriculum consultations
- Circulating resources
- Professional development workshops

Visit ***nelson-atkins.org/learn/educator-resources*** for information.

Mapping the Heavens is co-organized with the Linda Hall Library of Science, Engineering, and Technology and supported by the Lilly Endowment Inc. The exhibition's concept was originally proposed by Husnain Noorbhai, Mellon Undergraduate Curatorial Fellow (2019-2021).