



SOCIAL STUDIES

Essential Questions	<i>How have technological advancements changed our perception of the cosmos?</i>
Outcomes	Students will be able to: • Answer questions about ancient astronomical sites • Summarize the purpose of astronomical sites • Describe the differences between the geocentric and heliocentric models of the universe • Describe the contributions of ancient astronomers • Write a summary of how technological advancements have changed the perception of the cosmos
Standards Benchmarks identified in RED are priority benchmarks.	G.b Relationships between the environment and societal development G.b.3 Technology R.3.5. Determine the main idea of a text and explain how it is supported by key details; summarize the text. (RI.4.2) R.3.7. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. (RI.4.3) R.3.17. Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (RI.5) W.2.1. Write opinion pieces on topics or texts, supporting a point of view with reasons.

TEACHERS: this content was designed for ABE/ASE students. Instructional scaffolding used in this lesson can be beneficial for multilingual students.

Because adult classrooms are multi-level, teachers will want to differentiate this HyperDoc by accommodating the different ways that students learn by using scaffolding strategies and appropriate leveled materials. Teachers will want to vary the instructional activities based on their student's needed skills.

For more information about collaborating and sharing on Google Drive, check out videos 36-45: [Google Junior Training series - YouTube](#).

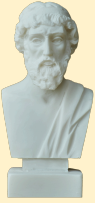
STUDENTS: Before you begin this lesson



- Go to File > Make a copy
- Change the name to: <your name> Cosmos Social Studies
- Begin working in your document
- When completing an activity, make a copy of the document and save with your name and the title of the activity

Be sure to read carefully. The green text is a prompt for reflection or activity.

ENGAGE



“Astronomy compels the soul to look upwards and leads us from this world to another.”

-Plato, ancient Greek philosopher

Did you know around 2,000 years ago the Hopewell Native American culture built earthen mounds designed to track the 18.6 year journey of the Moon around the sky located in present day Newark, Ohio that has been designated a World Heritage site?

Click on the image below to watch a video about the Hopewell Mounds:



(PBS News Hour 7:29)

Click on the image below to watch *What Constellations Mean to Different Cultures | Fate & Fabled:*



(10:31)

EXPLORE

Ancient Astronomical Sites around the world

Hundreds of astronomical sites built by ancient civilizations exist around the globe. Let's explore some of the oldest and most well known sites.

Print out or save the [Ancient Astronomical Sites worksheet](#). Pay close attention as you read the articles and watch the videos below so that you can answer the questions in the worksheet.

STONEHENGE

One of the most famous megalithic structures in the world dating to around 3,000 BC - 2,000 BC, Stonehenge is located in Wiltshire, England . Why it was built is still being debated today. Click on the video and read the article below to learn more about the oldest astronomical site in the world.



Rachelle Haun, CC BY 2.0, via Wikimedia Commons

Read:

[Teach Astronomy - Stonehenge](#)

Click on the image to watch *How science is uncovering the secrets of Stonehenge:*



(7:36)

Click on the link below to view an Interactive Stonehenge exhibit. Using your mouse, scroll around and click on the bullseyes to learn more about the building and history of Stonehenge.

[Stonehenge Virtual Tour - Inside The Stones | English Heritage](#)

NABTA PLAYA

Located in the Nubian Desert in modern day Egypt, Nabta Playa is an ancient astronomical site estimated to be around 7,000 years old.



Photo: [Raymbetz](#), CC BY-SA 3.0, via Wikimedia Commons

Click on images and links below to learn more about the oldest astronomical site in the world.

Watch:



(3:28)

Watch:



(3:00)

Read:

[Nabta Playa: The world's first astronomical site was built in Africa and is older than Stonehenge](#)

EL CARACOL AT CHICHEN ITZA

The pre-Columbian Maya civilization built El Caracol at Chichen Itza located in modern day Yucatán State of Mexico around 750 to 900 AD. Archeologists suggest that the El Caracol was an ancient Mayan observatory building and provided a way for the Mayan people to observe changes in the sky. Click on the video and read the article below to learn more about the oldest astronomical site in the world.



Daniel Schwen, CC BY-SA 4.0, via Wikimedia Commons

Watch:



(2:28)

Read:

[Ancient Astronomy in Mexico | NASA Blueshift](#)

Think about what you have learned so far and answer the question in the box below. Be sure to summarize your answer using your own words.

What is the common purpose the sites serve for ancient civilizations?

EXPLAIN

ANCIENT GREEK ASTRONOMY AND THE PTOLEMAIC (GEOCENTRIC) MODEL



Harmonia macrocosmica

[Andreas Cellarius](#), Public domain, via Wikimedia Commons

Ancient Greek philosophers studied the world through observations and inquiry to try to explain natural phenomena. Their practice of observations and inquiry led to the basis of the scientific method still practiced today.

Watch:



(5:00)

Read:

[Decoding the Antikythera Mechanism, the First Computer](#)

Type your answer in the box below:

What did the antikythera mechanism do and why is it important?

Watch:



(9:51)

Read:

[The life of Ptolemy, ancient astronomer | BBC Sky at Night Magazine](#)

[Ancient Greek Astronomy and Cosmology | Modeling the Cosmos | Articles and Essays | Finding Our Place in the Cosmos: From Galileo to Sagan and Beyond | Digital Collections | Library of Congress](#)

In the box below, list two things most notable about Ptolemy's astronomical observations:

1.

2.

APPLY

16TH CENTURY SCIENTIFIC REVOLUTION / PTOLEMAIC (GEOCENTRIC) MODEL VS HELIOCENTRIC MODEL

The scientific revolution marked a significant change in our understanding of the natural world. The change was so radical that scientists of the day were actually put on trial for suggesting that the Earth revolved around the Sun.

Early history of the telescope:

Watch:



(5:45)

Read:

- [History of the Telescope](#)
- [Geocentrism vs heliocentrism explained | BBC Sky at Night Magazine](#)
- [Teach Astronomy - The Trial of Galileo](#)

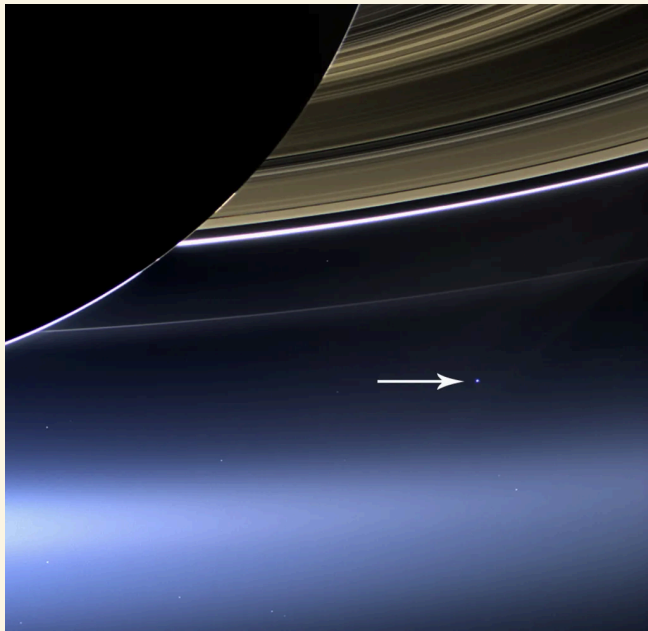
After learning about the geocentric and heliocentric models of the universe, list the characteristics of each in the table below.

Geocentric Model	Heliocentric Model
• • •	• • •

COLLABORATE

HISTORY OF ASTRONOMY PHOTOGRAPHY

The invention of photography was a major milestone in our ability to observe the night sky. Instead of relying on drawings of observations, photography was able to capture and preserve a moment in time. Photographic technology evolved over the years and led to several important shifts in our understanding of the universe.



In this rare image taken on July 19, 2013, the wide-angle camera on NASA's Cassini spacecraft has captured Saturn's rings and our planet Earth and its moon in the same frame.

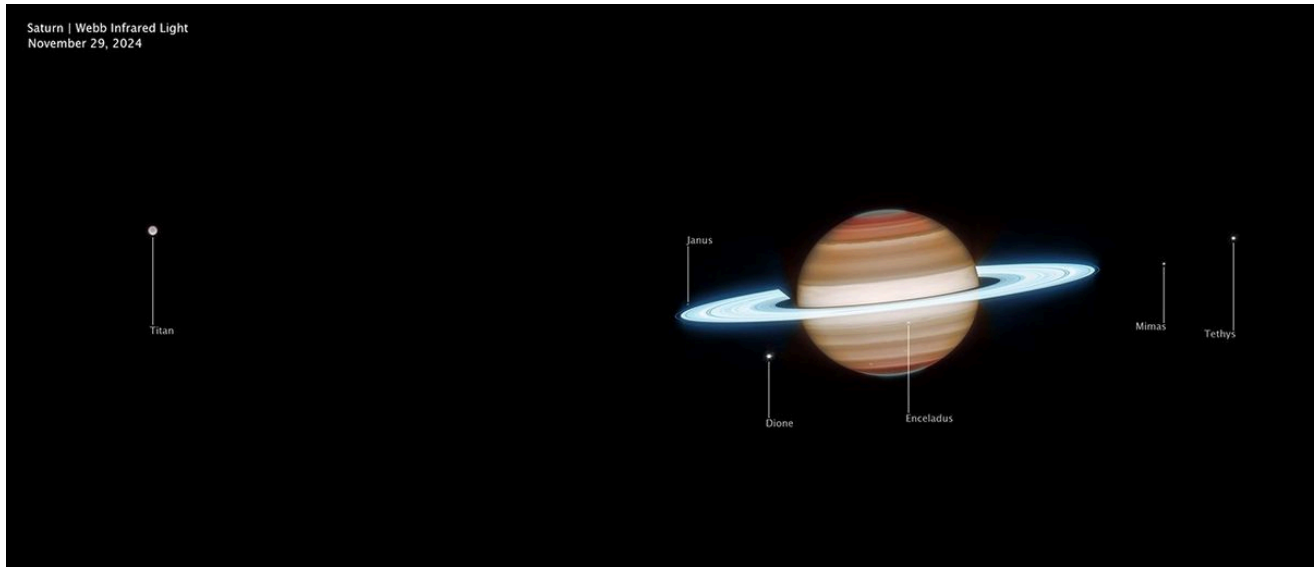
"Look again at that dot. That's here. That's home. That's us. On it everyone you love, everyone you know, everyone you ever heard of, every human being who ever was, lived out their lives."

"It's been said that astronomy is a humbling, and I might add, a character building experience. To my mind, there is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world. To me, it

underscores our responsibility to deal more kindly and compassionately with one another and to preserve and cherish that pale blue dot, the only home we've ever known."

Carl Sagan - Pale Blue Dot: A Vision of the Human Future in Space

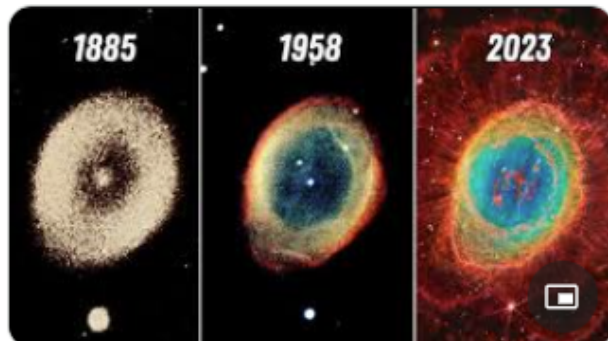
Click on the image below to see a larger version:



A wider view of Saturn from NASA's James Webb Space Telescope shows six of Saturn's larger moons, including the largest, Titan, at far left.

Image: NASA, ESA, CSA, STScI; Image Processing: Joseph DePasquale (STScI)

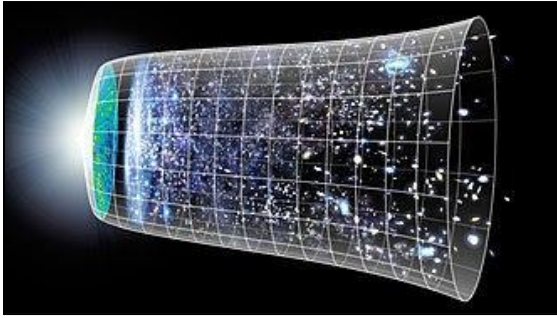
Watch:



(20:38)

Create your own timeline!

Click on the image below to navigate to a digital timeline creator. Click [here](#) for instructions on how to use the timeline tool.



As you read through the articles below, right click and save up to 5 pictures that show the evolution of astronomy photography then put them in order on the timeline. Include the name of the space object photographed and date.

Read:

[How astrophotography revolutionised our view of the Universe | BBC Sky at Night Magazine](#)

[The History of Astrophotography | High Point Scientific](#)

[100 years of Astrophotography - Exhibition | Musée de la Photographie](#)

[Eight of the Most Important Space Discoveries Since the Apollo Landings | KQED](#)

REFLECT

Now let's look back to our essential question. In your own words, how have technological advancements changed our perception of the cosmos?

Type your answer in the box below:

EXTEND

Are you curious about space now and want to take a look for yourself? Below are links to two observatory parks and a dark sky map. The dark sky map shows where the best viewing sites are with the least light pollution.

Dark Sky Map

<https://darksitefinder.com/map/?i=/>

John Glenn Astronomy Park

<https://jgap.info/>

Observatory Park

<https://geaugaparkdistrict.org/park/observatory-park/>