

Global Studies Year 7 – Week 2

The Early Astronomers and How they Understood the World Around them



Week 2, Lesson 1

Success Criteria

Students will gain an understanding of how early astronomers in different cultures attempted to understand the nature of the universe.

Task 1: Open your **Red Book** and write down today's date and 'Lesson 1: The Early Astronomers and how they Understood the World around them.' Next write the heading 'The History of Astronomy.' This will give us a big picture overview of how astronomy has changed over the years and how some early astronomers made some remarkably accurate discoveries about how the universe works.

Task 2:

a. Write down the following definition of 'Astronomy' – in full.

The study of everything in the universe beyond Earth's atmosphere. This includes objects we can see with our naked eyes, like the Sun, the Moon, the planets, and the stars. It also includes objects we can only see with telescopes or other instruments, like faraway galaxies and tiny particles.

b. Next watch the video clip on the difference between AD and BC, then answer the questions below. 'What does BC/AD Mean?'

<https://www.youtube.com/watch?v=Y7veVKqU3IA>

1. What do the initials BC stand for?
2. What do the initials AD stand for?
3. What is the difference between the letters BCE and CE? What do these abbreviations represent. For instance, FBI is short for Federal Bureau of Investigation.

BC

AD

BCE

CE

Task 3: As a class we will watch the video clip on the history of Astronomy.

<https://www.youtube.com/watch?v=RVXFrDYxm80> (14:06 sec.)

Class Discussion: Are you surprised by how much early astronomers were able to tell about the universe?

After watching the video, answer the following questions:

1. Who were the first known people to suggest that the Earth was a sphere (see 1:55 sec mark)
2. Early astronomers estimated the circumference of the Earth (the distance around something) was 46,250 kms. How close were they to the real figure? (2:30 sec mark).
3. write down 5 interesting facts from watching the rest of the video, and write them down in the form of dot-points.

Homework: Make sure that your **Red Books** are up to date and all the tasks have been completed.

Week 2 Lessons 2 & 3 – The Early Astronomers

Success Criteria

Students will gain an understanding of how early astronomers in different cultures attempted to understand the nature of the universe and the remarkable discoveries they made.

For tens of thousands of years, human beings have been fascinated by the patterns of stars in the sky above Earth. Early on, they noticed that the Moon changed shape from night to night as well as its position among the stars. People in different cultures wanted to figure out what was happening, so they studied the skies and made observations and measurements.

Today we are going to learn about some of the most influential astronomers who made major contributions to understanding the world around them.

Task 1: Read the article below on some of the most important early astronomers. Once you have read the article, in your **Red Books** write a heading and list 3 dot-points in your own words, about their accomplishments or life. The first one has been done as an example.

1. Aristarchus of Samos (310–230 BC)

- a. he lived in ancient Greece and studied math
- b. made the first known map of the solar system
- c. created an accurate diagram of the solar system placing the Sun at the centre and the Earth revolving around it

2. Eratosthenes (276–194 BC)

3. Hipparchus (190–120 BC)

4. Gan De (Around 400–340 BC)

5. Ptolemy (100–170 AD)

6. Aryabhata (476–550 AD)

7. Nicolaus Copernicus (1473–1543)

8. Galileo Galilei (1564–1642)

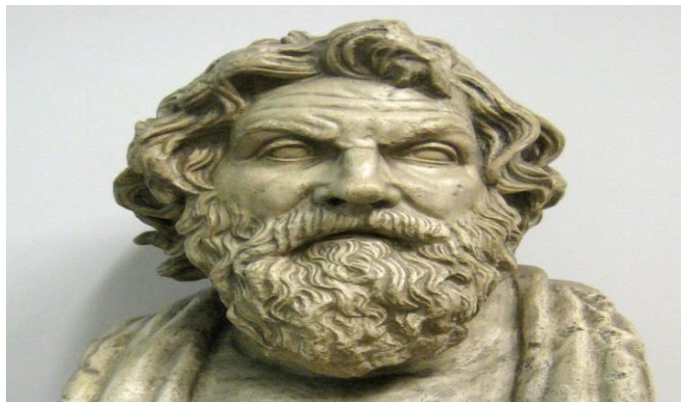
Nine of the World's Most Influential Early Astronomers



The sky is a time machine of sorts. It transmits the light of long-dead stars that are often millions of years old, allowing us to gather knowledge on the history of our universe and how it was formed. The understanding of our universe is also possible thanks to a rich history of astronomers observing it and gradually adding to our knowledge of the way celestial objects move. Here is a list of some of the most influential early astronomers throughout history.

1. Aristarchus of Samos (310–230 BC)

Aristarchus of Samos was an ancient Greek mathematician and astronomer that is credited with having created the first-known map of our solar system, which placed the Sun at the center and Earth as a planet revolving the Sun.



A statue of Aristarchus

Aristarchus also correctly predicted the rotation of Earth around an axis and correctly stated that other stars were similar in nature to the Sun, and were much farther away from Earth.

2. Eratosthenes (276-194 BC)

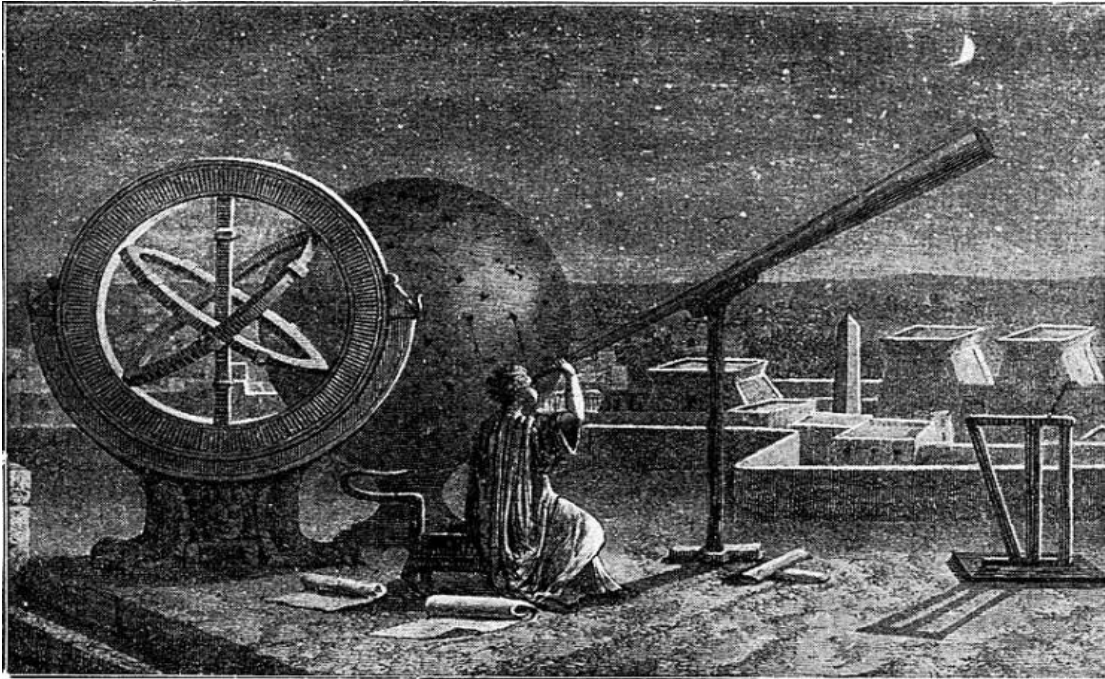
Eratosthenes became the Chief Librarian of the Great Library of Alexandria in ancient Greece. He is credited with having made some incredible calculations – especially considering the lack of tools at his disposal when compared with modern astronomers – that still hold up today.

Eratosthenes calculated the distance between the Sun and Earth and was only off by a few percent when compared with modern measurements. Similarly, he gave an impressively accurate measurement of the circumference of the Earth.

The ancient Greek astronomer is also recognized as having devised the need for a leap day, for having calculated the Earth's axis, and for having devised a map using meridians and parallels, which became the basis for indicating the position of stars in star charts that were used in astronomy and navigation.

3. Hipparchus (190-120 BC)

Hipparchus is credited as the founder of trigonometry and spherical trigonometry. The ancient Greek astronomer and mathematician used his work to develop his theories on lunar motions, allowing him to become the first person to successfully predict solar eclipses.



Woodcut Illustration of Hipparchus observing the sky from Alexandria.

Aside from developing the first accurate models to describe the relative motions of the Sun and Moon, Hipparchus also compiled the first star catalog in the Western world.

4. Gan De (Around 400-340 BC)

Gan De is the first individual, alongside his colleague Shi Shen, in known history to have compiled a star catalog. Though star catalogs are known to have been compiled by unknown Babylonian astronomers, Gan De is the first to have been recorded by history.

Also known as Lord Gan, Gan De made some of the first recorded observations of Jupiter. The Chinese astronomer and astrologer, who was born in the state of Qi, found ingenious ways to work around the technological limitations of the time. One method he used, for example, was to use a high tree branch to shield his vision from the glare of Jupiter, allowing him to make a naked-eye observation of one of Jupiter's moons.

A catalog compiled by Gan De and Shi Shen was discovered as part of the second century BC Mawangdui Silk Texts. It included surprisingly accurate movement observations of Jupiter, Venus, and Mars.

5. Ptolemy (100-170 AD)

Ptolemy's scientific treatise, *Almagest*, contains a comprehensive – for the time – star catalog, with detailed descriptions of 48 constellations as observed by the Greek astronomer and mathematician.



A sketch of Ptolemy

Much of Ptolemy's *Almagest* was usefully formatted in convenient tables that made it easy to calculate the past and future positions of celestial objects.

6. Aryabhata (476–550 AD)

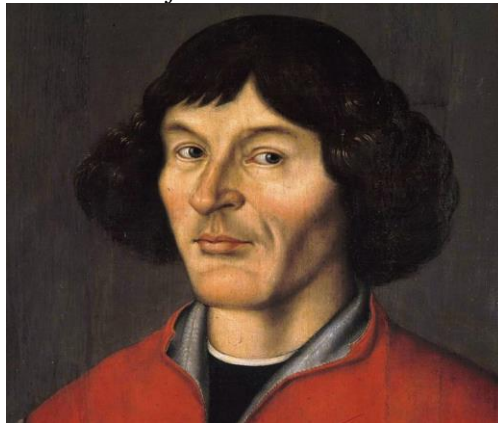
Unfortunately, much of Aryabhata's prodigious talent has been lost to history. The Indian astronomer and mathematician was merely 23 years old when he wrote his most famous astronomical work, titled the *Aryabhatiya*. The original text was sadly lost, meaning that most of what is known about the astronomer's work is known today thanks to what was written down of it by contemporaries of his.

Amongst Aryabhata's achievements are the correct observation that the Earth rotates once around its axis every day, and that the visible movement of the stars and the Moon across the night sky occurs thanks to the rotation of the Earth.

Aryabhata also correctly calculated the length of the day as being 23 hours, 56 minutes, and 4.1 seconds – this was correct to within a millisecond when compared with modern values. As for the correct value for the exact time of a year, Aryabhata calculated this as being 365.25858 days, which was only 3 minutes and 20 seconds over the length of a modern year.

7. Nicolaus Copernicus (1473–1543)

Though earlier astronomers had previously claimed that the Sun was the center of the solar system, Nicolaus Copernicus finally shattered the popularly believed and incorrect notion that all celestial objects revolved around the Earth.



Copernicus, of Poland, published his book, *De Revolutionibus Orbium Coelestium* ("On the Revolutions of the Heavenly Spheres") when he was 70 and on his death bed. Though his ideas didn't ignite the popular imagination until almost a hundred years later, his heliocentric model of the solar system is integral to our understanding of the universe today.

8. Galileo Galilei (1564–1642)

Galileo built on Copernicus's ideas to become one of the most important figures of the scientific revolution of the 17th century. Born in Italy, Galileo developed the first pendulum clock and proved that all falling bodies fall at the same rate, regardless of mass. He also experimented with and helped to refine the technology behind telescopes. Thanks to this technology, the Italian astronomer is credited with having discovered Jupiter's four largest moons, known today as the Galilean moons. Galileo also helped popularize the Copernican heliocentric model of the solar system,

which states that the Sun is at the center of our solar system. The Catholic church at the time forced Galileo to recant his theories about the heliocentric world model and kept him under house arrest for the last nine years of his life.



Above – a painting of Galileo

Week 2 Lesson 3

Current Event Analysis

‘Eurasian Fluff’ –

The Nadia Lim Controversy



Nadia Lim is a famous Kiwi Chef and TV personality and the founder of a New Zealand home food service that delivers recipes and ingredients to customer’s houses around the country. Recently the head of a Kiwi company who is male, made fun of her body and her Malaysian-Chinese ethnicity in criticizing her. This resulted in many Kiwis including Prime Minister Jacinta Ardern to come out and support Lim and label the comments as inappropriate.

Task #1: In your Red Books, write out the questions and responses to the following questions. **DO NOT** watch the video or read the article **UNTIL** you have written out the questions and completed the definition for questions 1 and 2.

1. Look up the word ‘sexist’ and write down the definition.
2. Write down the word ‘misogynistic’ and give the definition.
3. Write down the definition of ‘belittle.’
4. Write out the following definition of Eurasian: A person who is of mixed European and Asian ancestry.
5. Write a newspaper opinion column about this case. In your column you will address 3 things: a) in your own words, write a summary of the event. What did Mr. Henry say, b) Explain why his remarks were considered to be offensive; and c) Defend Nadia Lim – why is it inappropriate to refer to her body and her Malaysian-Chinese ethnicity.

Task 2: Watch the video – 'Damaging': Nadia Lim addresses 'misogynistic, sexist' comments directed at her by rich-lister at: https://www.youtube.com/watch?v=iGvT70-s_2I

Task 3: Optional (meaning you don't have to do it) – you may find the READING below helpful in writing your summary. Jamie Ensor, 'Jacinda Ardern calls rich-lister Simon Henry's Nadia Lim comments 'insulting to all women,' Newshub, May 6, 2022.

Jacinda Ardern calls rich-lister Simon Henry's Nadia Lim comments 'insulting to all women'

The Prime Minister has called a rich-lister's controversial comments about businesswoman Nadia Lim "insulting to all women".

Simon Henry, the founder and head of a chemical company has claimed that Kiwi celebrity chef Nadia Lim was using her to use her sexuality to raise interest in the company she founded – My Food Bag after the company did not do so well last year.

"When you've got Nadia Lim, when you've got a little bit of Eurasian fluff in the middle of your prospectus with a blouse unbuttoned showing some cleavage, and that's what it takes to sell your scrip, then you know you're in trouble," said Simon Henry who is worth an estimated \$700 million dollars.

The remarks have been widely condemned.

Prime Minister Jacinda Ardern has added her voice to the chorus of criticism when asked what she, as a female leader, thought of Henry's comments.

"When I saw those comments, not only does that do a complete disservice to Nadia herself, but I imagine it would have been insulting to all women. The success of Nadia Lim speaks for itself," she said.

Limn told AM on Thursday she was saddened by Henry's comments and the potential effect it may have on other Asian women in business.

"I'm a tough cookie. I have had enough years and support to become resilient and confident. My big issue with it is, it saddens me how other people and women and women of colour and ethnic backgrounds might see themselves in those comments and how they would feel hurt," Lim said on Thursday.

"I had the chance to reflect on these comments when I caught my flight from Christchurch back down home to Queenstown yesterday and my air host was this lovely, awesome Eurasian girl who was quite a bit younger than me and clearly of Asian descent.

"I smiled at her and she smiled back and then it hit me like I wonder what she thinks when she reads comments like this or hears things like that."

National deputy leader Nicola Willis, who has held senior commercial roles, such as at Fonterra, told Newshub that Lim should be proud of her achievements.

"The belittling of her on the basis of her looks and clothes is pathetic. What a completely outdated worldview. Those sorts of remarks are completely out of step with the attitudes I would expect to see in a modern thriving Kiwi business. I think the remarks say a lot more about the person making them than the person they were targeted at."