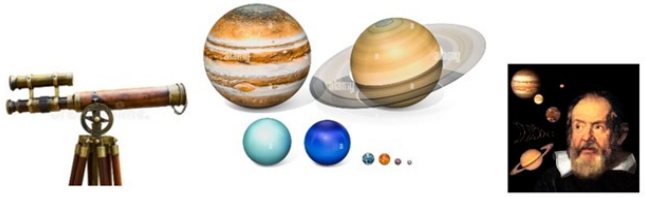
In this unit we will

1. Look at evidence for the shape of the Earth, Moon & Sun
2. Understand the relative sizes of Earth, Moon & Sun and learn about the heliocentric model of our solar system
3. Develop an understanding of the planets in our solar system
4. Understand how the rotation of the Earth causes night and day
5. Understand how the movement of the Earth in its orbit causes the seasons



Earth and Space

Science Skills that we will develop:

Explaining Science

1. I use complex science words correctly
2. I use a science model to describe and explain
3. I draw & annotate diagrams to help describe/explain

Data, Table & Graphs

1. I join plotted coordinates with straight lines

Re-cap of last lesson - Describe & Explain the relative sizes of the Earth, Moon & Sun; name the planets in order

↓

Learn about how scientific thinking has changed over thousand of years

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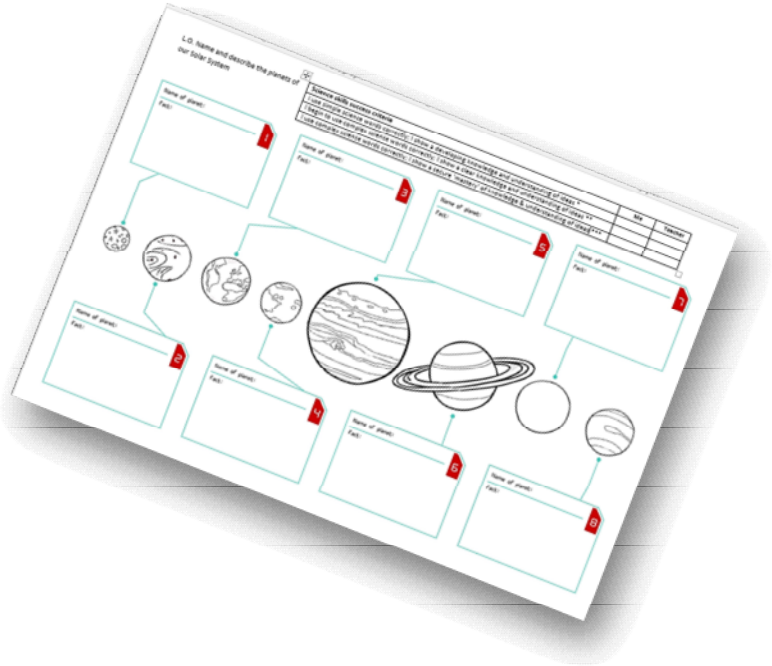
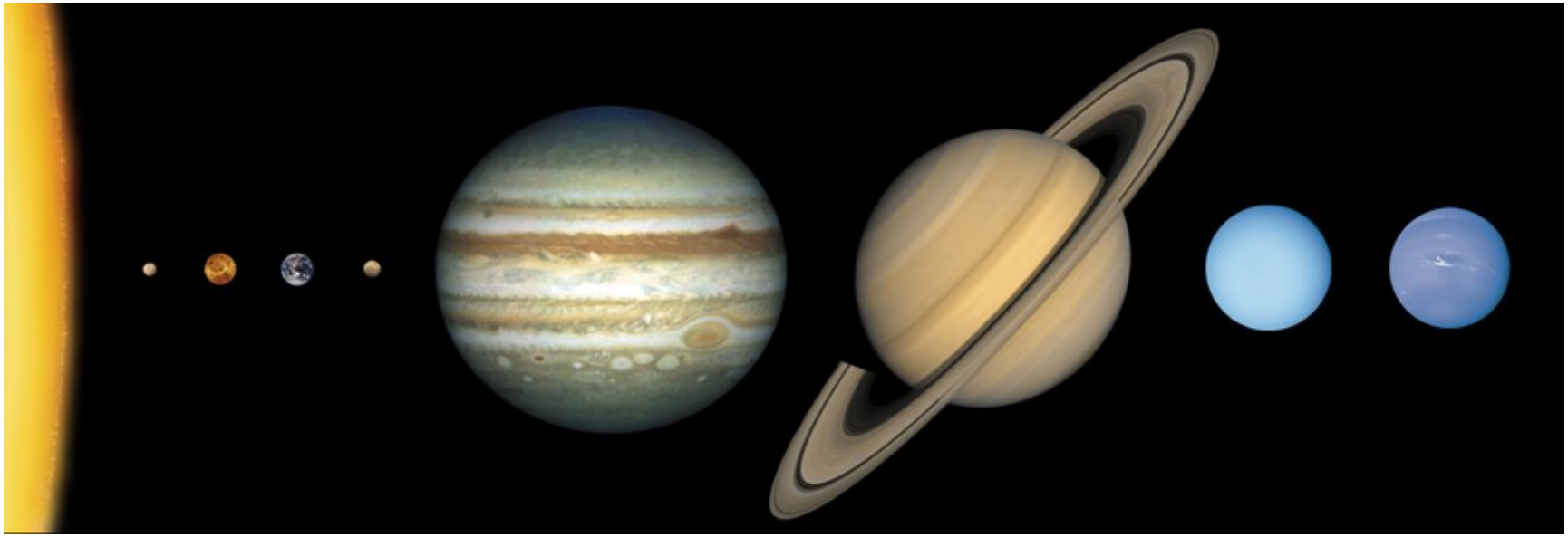
Label and then use a model of the solar system to explain the movement of the planets

Can you remember which of these represented the relative sizes of the Earth, Moon and Sun? How far apart are they (on this scale?)

Tell your partner three facts that you learnt in the last lesson about the planets. Can anyone remember their mnemonic and name all eight planets in the correct order?



L.O. Understand the **movement** of planets in our Solar System and how scientific ideas have changed over time.



Before we start the lesson, can you work with your partner to draw a diagram with labels on a whiteboard, to help you explain how the planets move in our solar system?

Share your ideas with the class.

Our understanding of how the planets move has been based on two different models: The Geocentric and the Heliocentric model of the Solar System...

It is easy for us now to assume that we have always known how the planets move, but as we know from our first lesson about the shape of the Earth, **scientific evidence** can change people's opinion and understanding.

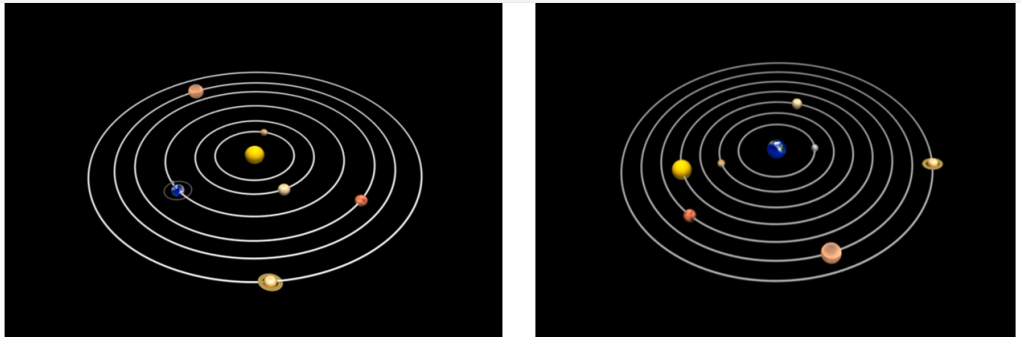
So how has our understanding of the solar system changed over the last 2500 years?

Geocentric_to_Heliocentric_Video.mov

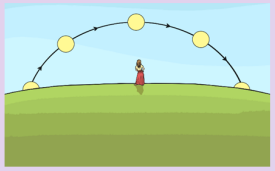
Geocentric Versus Heliocentric

How much can you remember from the video? Discuss with your partner and share with the class.

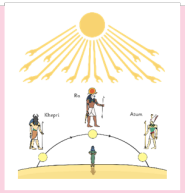
Let's re-cap on the next few pages...



Early Humans – circa 12000 BC

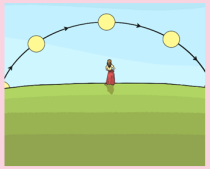


Ancient Egyptians – circa 5000 BC



Ancient Indians – 1400 BC

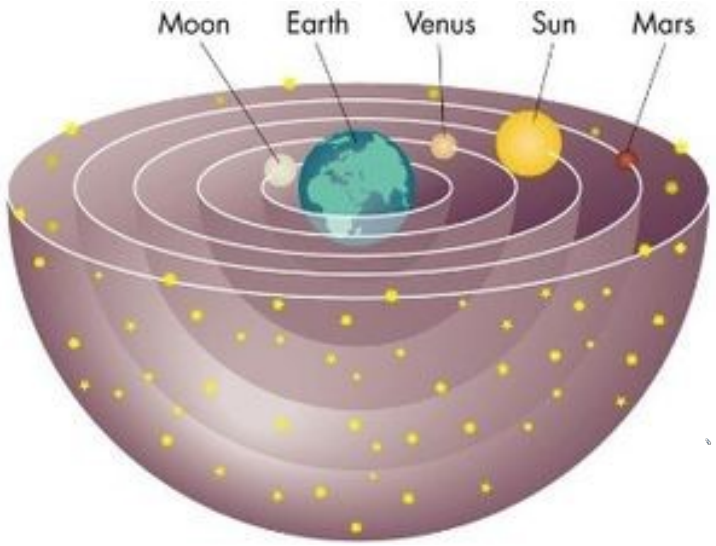
Ancient Babylonian/Sumerians – 700 BC



Since the beginning of human history, people have noticed the apparent movement of the Sun, Moon and stars across the sky. This evidence suggested that the Sun moves around the Earth. Ancient civilisations all believed this 'geocentric model'.

Earth centre

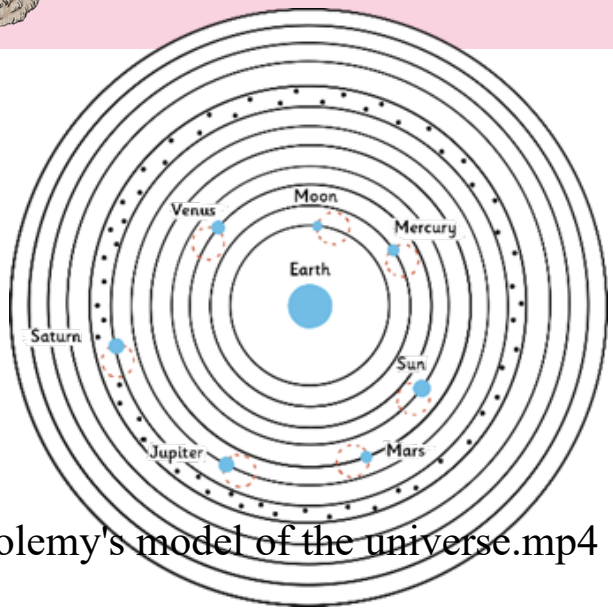
Aristotle - 384 - 322 BC



The Ancient Greek philosopher, Aristotle, was among the first to propose a model of the 'Universe' that had the Earth surrounded by a series of spheres, to which the known planets were attached. These were thought to move around the Earth.

Aristotle Spheres.mp4

Ptolemy - AD 85 - 165



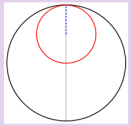
ptolemy's model of the universe.mp4

The Greek astronomer, Claudius Ptolemy, wanted to explain why sometimes planets seemed to go backwards, so he came up with the idea that they moved in mini orbits as they moved around the Earth. We now know that this is because the Earth is also moving (just like overtaking another car - it looks like it's going backwards, but it's just us going faster). His model was accepted for around 1000 years.

Alhazen - AD 1025 – 1028

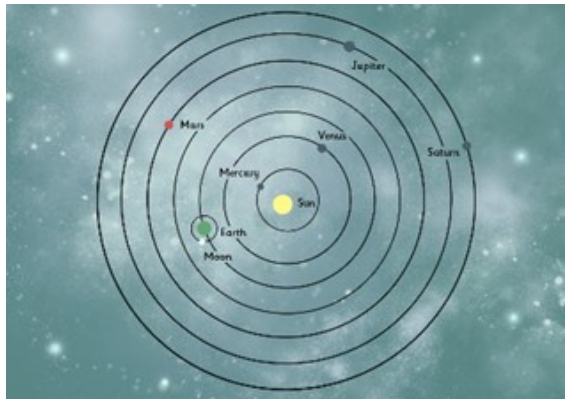
Al Katabi – circa AD 1230 - 1240

Tusi – AD 1247



Copernicus – circa AD 1530

It was Islamic scientists that first began to suspect that the Earth was not at the centre of our solar system. However, they did not have enough evidence to suggest a different model to Ptolemy's.



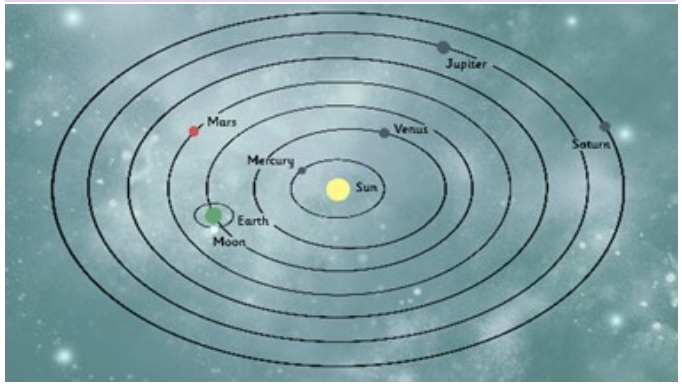
The Polish astronomer, Nicolaus Copernicus, realised that it made more sense for the Earth to be orbiting the Sun - an extremely controversial suggestion.

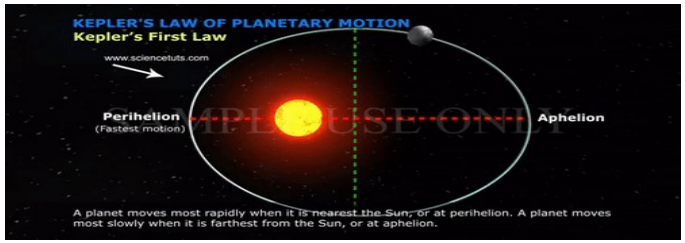
Galileo – AD 1615

Italian astronomer, Galileo Galilei, changed everything with his observations made with a telescope. He agreed with Copernicus that the Sun must be at the centre of the Solar System, rather than the Earth. This 'heliocentric' model nearly got him killed, as it went against the religious belief that because God made the Earth, it was perfect and was at the centre of all things

sun centred

Kepler – AD 1617-1621



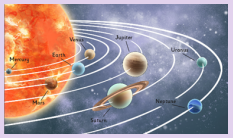


Johannas Kepler was the first to actually propose a working model of a **heliocentric** solar system, which included the theory that planets moved around the Sun in elliptical (oval) orbits, rather than perfect circles. This better explained the observed movements of the planets and also helped to predict their future movements.

Newton – AD 1687

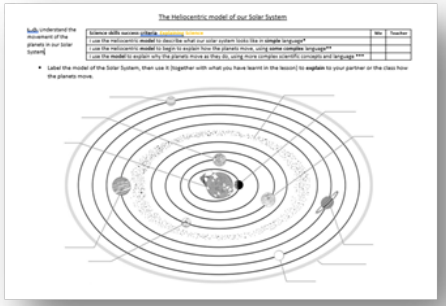
English scientist Isaac Newton developed his ideas about gravity and how this caused the planets to stay in their orbits around the Sun. The heliocentric model is now accepted by everyone, including the Church.

Present Day



Scientists work on evidence and form their ideas based on what they understand. It took over 2000 years of changing ideas to arrive at our modern understanding of the Solar System. Do you think that this is the end of the story? Why?

Now look at the Heliocentric model diagram on your worksheet and **label all the planets**, using your work from our previous science lesson.



You will also need these two labels:

Asteroid Belt (this is a belt of rocks between Mars and Jupiter)

Kuipier Belt (pronounced, "Kiper Belt", this is a belt mainly of ice objects and includes dwarf planets such as Pluto - it lies outside of Neptune's orbit)

Use your labelled diagram and the rest of the lesson's information to describe and explain to your partner how the planets move within our Solar System.

Write a short paragraph to explain what you understand.

rotate	scientist	elliptical
solar system	observation	circular
planets	movement	gravitational pull
heliocentric	geocentric	orbit