## **Resource 12A: Assignment Briefing**

As travellers and detectives through time and space, you are to investigate the infamous case of Galileo Galilei. For centuries people have said that this man was one of the fathers of modern science – that he helped us to find better ways of understanding our world. So why did some of the people of his time oppose him and try to silence him? Did they treat him unjustly, or did they have reason? What is science? Is science really the best – even, as some say, the only - way to learn the truth about the world? What are its limits? I look forward to hearing your thoughts on these matters when you return.

I have extracted three witnesses from their own time and placed them in our extra-temporal interview room – a place out of time and space. When they return to their own time they will remember nothing. I have enclosed for your deliberation brief witness statements from all of them, together with a brief history of the episode (you may usefully carry out more research of your own).

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## **Resource 12B: History of the Case**

In 1543 a Polish man called Nicolaus Copernicus published a book called ‘On the Revolutions of the Heavenly Spheres’. In this book he described a model of the universe with the sun at the centre and the planets, including the Earth, going around it (this is a heliocentric model – meaning ‘sun at the centre’). He thought that this model – which used mathematics to describe the movement of the planets -was a good explanation of the way they moved across the sky.

Copernicus didn’t publish his book until he was dying because he was afraid that some people would find it upsetting and even offensive! Almost two thousand years before, a famous Greek thinker called Aristotle had said that the Earth was at the centre of the universe (this is a geocentric model – meaning Earth at the centre). He said that the sun, the moon and the other planets all moved around the Earth and were attached to moving spheres of crystal. The outer sphere was the ‘Prime Mover’ – the source of all movement in the universe! This model was improved to explain the detailed movement of the planets across the sky by Ptolemy about five hundred years later. The new model was a little complicated, but it explained things quite well, and it seemed to make sense to people that the Earth was at the centre of things.

The Catholic Church supported the idea that the Earth was at the centre of the universe. People in the church suggested that Aristotle’s outer sphere could be understood as God. They also thought that the model agreed with some passages of the bible –Joshua commanding the sun to stand still, for example (which wouldn’t have been necessary if it were already still at the centre of the universe). Many people believed that Holy Scripture was the best source of truth. So everything seemed to fit quite well, and most people were happy with this view of the universe.

Copernicus was a member of the church and a very religious man. He didn’t want to offend anyone – and he may have been worried that people would laugh at him because his ideas were different. Actually, though, people in the church showed interest in his work. Many people said that it was a useful model of the universe (it helped us to predict how the planets move, for example) and it wasn’t really supposed to represent the truth, which could be found in the scriptures.

In 1610, an Italian called **Galileo Galilei** saw some things that seemed to support Copernicus’s ideas. He saw these things through a telescope which he had made himself after hearing about its invention in Holland. He saw that the moon’s surface was not completely smooth as people had believed. He saw four ‘planets’ (we would now call them moons) going around Jupiter – until then people believed that all the heavenly bodies went around the Earth. He also saw that the apparent shape of Venus changed in the same way as that of our moon, depending on where the light was striking it and which parts of it were in shadow. This, Galileo suggested, might be explained if Venus were going around the sun.

People in the church were interested in Galileo’s work at first – his friend Cardinal **Maffeo Barberini**, for example, encouraged him to continue. But it was made clear to Galileo that he should not say – or even think – that the Earth REALLY went around the sun – it was just a useful model for predicting the movement of the planets. The church was clear – as were many other people - that Galileo didn’t have enough evidence to overturn centuries of thinking and to go against people’s understanding of scripture.

However, Galileo became convinced that Copernicus’s model of the universe was in fact the truth – the Earth really was moving around the sun. He invited some of those people who didn’t believe him to look through the telescope themselves – but the story goes that they refused to look! One of these people is thought to have been **Cesare Cremonini** – a professor who worked at the same university as Galileo.

In 1632 Galileo published a book called ‘Dialogue Concerning the Two Chief World Systems’. Through his book he tried to convince people that the evidence that the sun was at the centre of the universe was clear, and that people who opposed this view were short-sighted and foolish (some of the arguments Galileo used were actually wrong, as we now know). Worse still, some people felt that one of the foolish characters in the book was representing the views of Galileo’s friend Maffeo Barberini, who by this time was the Pope! Galileo also suggested that the church needed to think about the bible stories which had seemed to support a geocentric universe in a different way.

The Pope (known as Urban VIII) was angered that Galileo had gone against his wishes, and furious that Galileo was telling people how to read the bible! Galileo was ordered to appear before the Inquisition – a much-feared group of investigators within the church - charged with heresy (believing something that contradicted the teachings of the church). In 1633 Galileo was made to say publically that there was no good argument for believing in a heliocentric universe. He was placed under house-arrest for the rest of his life, and his book was banned.

Of course, the story didn’t end there. Other people tested the ideas of Copernicus and Galileo, and found them to be the best way to explain their observations of the heavens; eventually the idea that the Earth is not at the centre of the universe and that it does go around the sun became widely accepted. You can still buy Galileo’s book today, and people now widely accept that we can learn about the world (and the wider universe) by making close observations and using these, together with tools like mathematics, to build theories about how things work that can be tested by further observations. Today we would call this ‘science’. But is science the best or even the only way to understand our world and our place in it? That is a hotly contested question!

## **Resource 12C: Witness Statements**

**Galileo**

I am quite exasperated by this whole affair! Why are people so stubborn! If they would only look through the telescope and open their minds they would see the truth! But no! They cling to their old ideas like a baby clings to her comfort blanket. New instruments like the telescope and new ideas in mathematics – a language through which we can really understand God’s universe - will help us to learn more about our world. My work is not heresy! It actually moves us closer to God’s truth and should be used to help us to understand scripture in a deeper and better way.

**Cesare Cremonini**

Galileo is becoming arrogant and his arrogance makes him blind! Does he honestly think that a few nights spent looking through this tube of his can overturn thousands of years of learning? Does he presume to be able to challenge the wisdom of the great Aristotle (on whose teachings my great reputation is based)? Why should I look through this new-fangled instrument? It gives me a headache! Mountains on the moon indeed – whatever next!

And Galileo should be careful. I know only too well how the Inquisition reacts when a person says something they don’t like – they questioned me when I suggested that the soul might not live forever. As I have always said, in private think what you wish, in public behave as is the custom!

**Maffeo Barberini (Pope Urban VIII)**

I’m hopping mad with Galileo! After all I have done to encourage him and to protect him from the Inquisition in the past! If only he were not so pig-headed. His theories about the movements of the planets are of interest and may even be useful. But to suggest that they describe reality is foolish and unfounded, as is the idea that God’s magnificent creation can be described by human mathematics. And to suggest that we look at (interpret) scripture in a different way based on the little work he has done is just unacceptable! He has no real proof! People look to the church – to scripture – for truth and understanding about the world. Does Galileo really believe that we will let him shake the truth that so many people hold dear? Can a few observations through this ‘telescope’, relying on our sense of sight which may so easily be deceived, really challenge what scripture and our reason tells us to be true?