

## Year 11 Physics student work sample – Grade A

Models of the universe

Since the period of early astronomers such as Aristotle and Ptolemy to later ones such as Isaac Newton, technology has been developed that allows both a greater quantity and more accurate data to be collected.

Astronomers such as Aristotle, Ptolemy, & Copernicus based their models of the universe through observations made with their eyesight. Therefore the most not available data was being collected. Although Copernicus based his heliocentric model using mathematics. In the late 1600s, Tycho Brahe collected large quantities and extremely accurate data over the period of 20 years. He had developed a sextant that could measure the angular distance between two objects and could be adjusted to  $60^\circ$  is at a degree in order to track the motion of the sun, moon and stars. He used a fine foot brass globe. These observations were incredibly significant as he used the available equipment to collect accurate data and develop his model of the universe known as the Tychoenic system - unlike previous astronomers who used the data collected with their eyesight. Furthermore, this data had allowed Johannes Kepler to develop the three laws of planetary motion.

The development of technology is further evident through Galileo's improvement to the spyglass that created a telescope with 3x magnification. This was later further improved to create a telescope with 30x magnification. Using this newly developed equipment, this had enabled him to discover four of Jupiter's moons. This was critical in supporting Copernicus' heliocentric model of the universe.

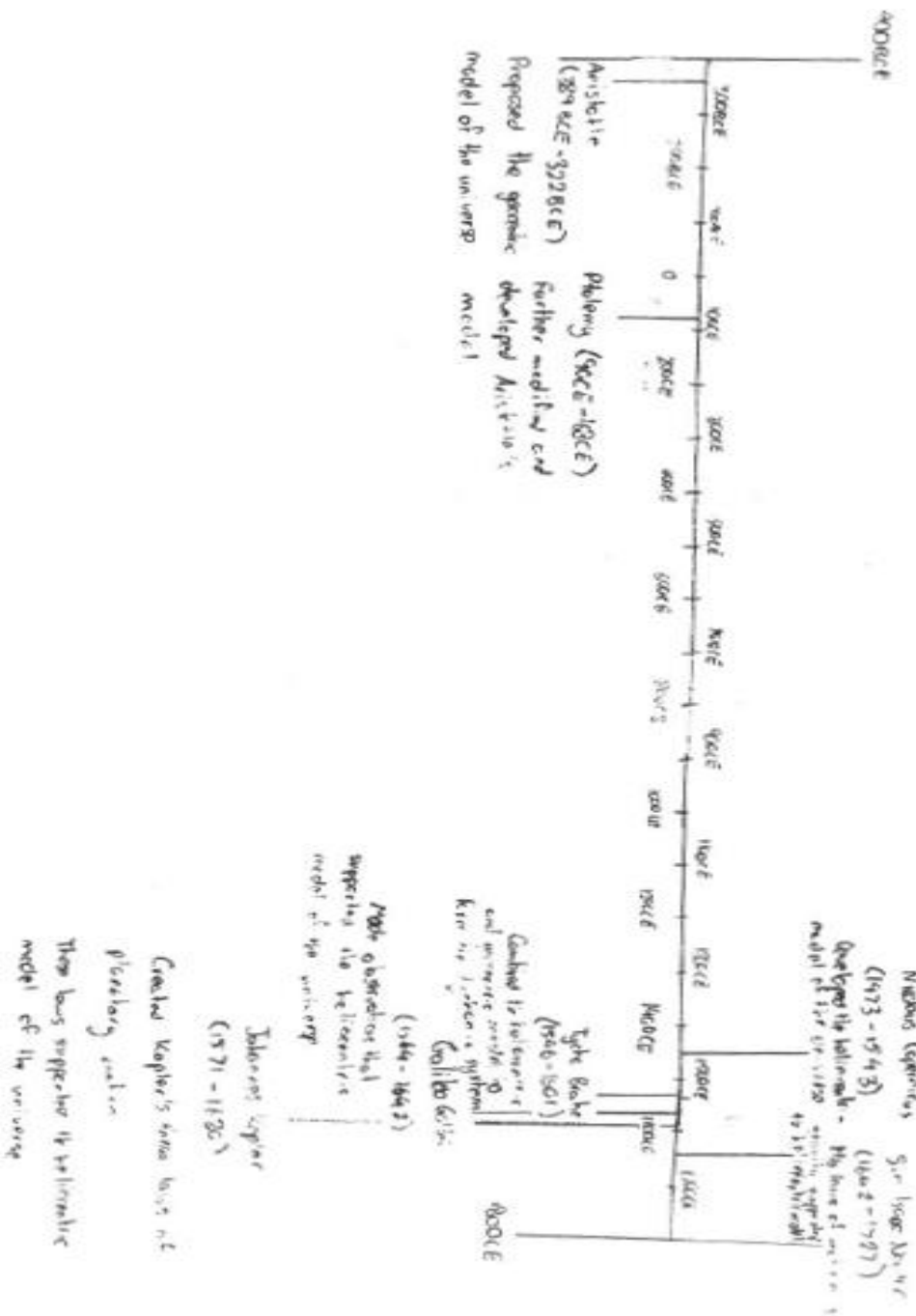
This summary demonstrates an extensive understanding of the topic and the information is presented in a logical sequence. It effectively communicates and links the complex concepts and clearly identifies the role of technology in the development of each model.

Includes Copernicus' use of mathematics to develop the heliocentric model of the universe.

as it had demonstrated that other objects orbited around different planets, not just the earth. As aforementioned, Kepler's use of Tycho Brahe's data had enabled him to develop Kepler's laws of planetary motion. The motion of the planets had supported the heliocentric model. Finally, Sir Isaac Newton's use of mathematics had established his laws of Motion & gravity. This was pivotal in explaining the workings of the universe that had supported the heliocentric model.

Through the development of increasingly accurate equipment, this enables greater quantities and more accurate data to be collected thus increasing its reliability. It enables astronomers to recognise the reality of how the universe works thus changing our ideologies of the model of the universe.

Although Brahe's use of the sextant and globe to make accurate measurements is clearly described, the response would be improved further by the inclusion of Brahe's model of the solar system



An effective and clear presentation of the key elements using an appropriate scale and including accurate dates for each scientist

### Grade Commentary

Lee demonstrates extensive knowledge and understanding of the significance of technology in the development of models of the solar system. The response is well structured and coherent and demonstrates perceptive analysis of the concepts.

Lee's response demonstrates characteristics of work typically produced by a student performing at a grade A standard.