

Celestial Mechanics: Nova's Stargazing Challenge

Learning objective: To understand the movement of the Earth and other planets relative to the Sun in the solar system, and to describe the movement of the Moon relative to the Earth.

Use your knowledge of our solar system to answer the following questions. Provide detailed explanations where required to demonstrate your understanding of planetary motion.

Word bank: Geocentric · Heliocentric · Axis · Orbit · Rotation · Lunar cycle · Spherical · Gravity

1. Nova the owl is observing the night sky. Explain why we experience day and night on Earth. Include the terms 'axis' and 'rotation' in your answer. (3 marks)

2. Compare and contrast the movement of the Earth around the Sun with the movement of the Moon around the Earth. How long does each orbit take? (3 marks)

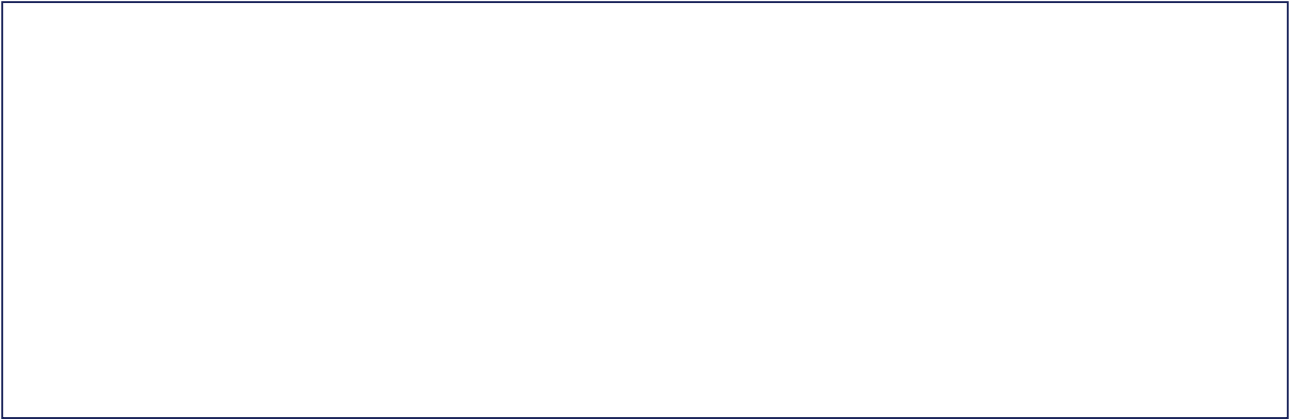
3. The ancient astronomer Ptolemy once believed the Earth was the centre of the universe (the geocentric model). Justify why modern scientists rely on the heliocentric model instead. (3 marks)

4. If the Earth's axis were not tilted, what might happen to the seasons we experience in the UK? Explain your reasoning. (3 marks)

5. Max the monkey is calculating the weight of an object on different planets. If gravity is weaker on the Moon than on Earth, would the mass of an object change if you moved it to the Moon? Justify your answer. (3 marks)

6. Why do the constellations appear to change position throughout the year from our viewpoint on Earth? (2 marks)

Draw: Draw a diagram of the Earth, Sun, and Moon. Use arrows to clearly illustrate the direction of the Earth's rotation and the path of the Moon's orbit around the Earth.



Extension challenge: Imagine you are a travel agent for space tourism in the year 2150. Write a short persuasive pitch for a trip to a gas giant planet, explaining how its day length (rotation) and year length (orbit) would differ from life on Earth.