

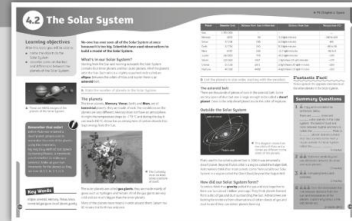
# 4.2 The Solar System

**Physics NC link:**

- gravity force, gravity forces between Earth and Moon, and between Earth and Sun (qualitative only).

**Working Scientifically NC link:**

- interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions.



Band	Outcome	Checkpoint	
		Question	Activity
Developing ↓	Name some objects in the Solar System (Level 3).		Starter 1, Plenary 1
	Name the planets in the Solar System (Level 4).	A, B	
	Identify some patterns in the Solar System (Level 3).		Main 2
Secure ↓	Describe how objects in the Solar System are arranged (Level 5).	1	Main 1, Main 2
	Describe some similarities and differences between the planets of the Solar System (Level 5).	2	Main 2
	Identify patterns in the spacing and diameters of planets (Level 6).		Main 2
Extending ↓	Explain how the properties and features of planets are linked to their place in the Solar System (Level 7).		Main 2, Plenary 2
	Compare features of different objects in the Solar System (Level 7).	2, 3	
	Use data to make predictions about features of planets (Level 7).		Main 2

**Literacy**

Students retrieve and collate information from a range of sources on space exploration, exploring the advantages and disadvantages of space travel, to summarise the information in a table.

**APP**

Students use the model of the orrery to explain the movement of the Earth and the Moon relative to the Sun (AF1). Students choose different methods of representing scientific data in the activity, transferring data from a table to a graph (AF3).

**Key Words**

ellipse, asteroid, Mercury, Venus, Mars, terrestrial, gas giant, dwarf planet, gravity

**Answers from the student book**

In-text questions	<b>A</b> There are eight planets in the Solar System. <b>B</b> Mercury, Mars, Venus, Earth, Neptune, Uranus, Saturn, Jupiter
Activity	<b>Remember that order!</b> Students should choose a suitable mnemonic with the correct initial letters.
Summary questions	<b>1</b> four, four, asteroid belt, dwarf, Oort Cloud (5 marks) <b>2</b> Similarities: They all orbit the Sun. They are round. Differences: The inner planets are made of rock, the outer planets, of gas. Outer planets are colder. You cannot see some of the outer planets with the naked eye. (2 marks) <b>3</b> Planets and asteroids both orbit the Sun. Some of the planets are made of rock like some asteroids. Asteroids are not spherical. <b>4</b> 6 mark question. Example answers: As you move away from the Sun the temperature decreases. Less light reaches objects that are further away. Less energy is transferred from the Sun to objects that are further away. More distant planets should be colder than nearer planets. Venus should be colder than Mercury because it is further from the Sun. It is



Starter	Support/Extension	Resources
<p><b>What do you know?</b> (5 min) Students sketch a diagram showing the objects they think are in the Solar System and their orbits. Use this to assess prior knowledge and draw out misconceptions.</p> <p><b>Models of the Solar System</b> (10 min) Show the video clip 'Models of the Solar System – Earth, Sun and Moon' from the Institute of Physics website. Students list 3–5 points from the video.</p>	<p><b>Support:</b> Provide a diagram for students to add labels to.</p> <p><b>Support:</b> Point out models of Sun, Moon, and Earth in video.</p> <p><b>Extension:</b> Students explain why we see 'wandering stars' (planets).</p>	
Main	Support/Extension	Resources
<p><b>The moving Solar System</b> (15 min) Students make an orrery (moving model of Sun, Earth, and Moon) in their books. This can also be done as a large demonstration model. One paper fastener fixes the Sun and the longer paper strip to the page so the strip can turn. The other paper fastener fixes Earth and the short strip to the other end of the longer strip, so Earth orbits the Sun. Glue the Moon to the other end of the shorter paper strip so it orbits Earth.</p> <p>Students use the orrery to explain phenomena in the Solar System. They suggest improvements to their models, for example, scale.</p> <p><b>The Solar System to scale</b> (25 min) At this point, it is important to introduce the difference between inner planets and outer planets, in particular about the materials they are made from. This can be done from the student book.</p> <p>Using a long, narrow strip of paper, students can display relative distances of planets from the Sun by folding the paper, or by using a scale diagram. Discuss patterns in the separations and the scale of the Solar System.</p> <p>Students then work through the activity sheet individually.</p>	<p><b>Extension:</b> Students add another planet, and use the orrery to explain why it seems to move forwards and backwards relative to Earth.</p> <p><b>Support:</b> Introduce the idea of scale and give students 30-cm rulers. The support sheet includes a table of data to help students answer the questions.</p> <p><b>Extension:</b> Calculate space-time to planet, discussing problems with space travel.</p>	<p><b>Activity:</b> The Solar System to scale</p> <p><b>Skill sheet:</b> Choosing scales</p>
Plenary	Support/Extension	Resources
<p><b>Objects in the Solar System</b> (5 min) Interactive resource where students order objects in the Solar System according to size.</p> <p><b>What planet am I?</b> (5 min) Each student writes down clues so their partner can guess which planet they are thinking of.</p>	<p><b>Support:</b> Ask students to focus on the relative sizes of the Sun, Earth, and Moon.</p>	<p><b>Interactive:</b> Objects in the Solar System</p>
Homework	Support/Extension	Resources
<p>Students research benefits and costs of space travel (e.g., spin-off technology, cost of manned versus unmanned expeditions).</p> <p>An alternative WebQuest homework activity is also available on Kerboodle where students research the planets of the Solar System.</p>	<p><b>Support:</b> Students fill out a table with two columns: advantages and disadvantages.</p> <p><b>Extension:</b> Students can add extra columns based on evidence and evaluation.</p>	<p><b>WebQuest:</b> Solar System tourist</p>

Resources