

4.1 The night sky

Physics NC link:

- our Sun as a star, other stars in our galaxy, other galaxies
- the light year as a unit of astronomical distance.

Working Scientifically NC link:

- understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review.



Band	Outcome	Checkpoint	
		Question	Activity
Developing	Name some objects seen in the night sky (Level 3).	A, 3	Starter 1, Starter 2
	Place some objects seen in the night sky in size order (Level 4).		Plenary 2
	Identify scientific evidence from secondary evidence (Level 4).		Starter 1
Secure	Describe the objects you can see in the night sky (Level 5).	D, 1	Starter 1, Starter 2, Main 1
	Describe the structure of the Universe (Level 5).	B	Main 1
	Draw valid conclusions that utilise more than one piece of supporting evidence (Level 5).		Main 2
Extending	Use the speed of light to describe distances between astronomical objects (Level 7).	4	Plenary 1
	Describe the structure of the Universe in detail, in order of size and of distance away from the Earth (Level 7).		Main 1, Plenary 2
	Assess the strength of evidence, deciding whether it is sufficient to support a conclusion (Level 7).		Main 2

Maths
Understand number size and scale with reference to a billion.

Literacy
Read information from a range of sources about the objects in the night sky and prepare a podcast for the public.

APP
Draw valid conclusions that utilise more than one piece of supporting evidence such as photographs of objects in space (AF4).

Key Words
star, artificial satellite, orbit, Earth, Moon, natural satellite, planet, Sun, Solar System, comet, meteor, meteorite, star, galaxy, Milky Way, Universe, astronomer

Answers from the student book

In-text questions	<p>A the Moon</p> <p>B Mercury, Venus, Mars, Jupiter, Saturn</p> <p>C A comet is an object with a tail that stays in the night sky and returns. A meteor produces a streak of light that lasts a very short time.</p> <p>D A galaxy contains millions of stars.</p>
-------------------	---

Summary questions	<p>1 Earth, Earth, Sun, Sun (4 marks)</p> <p>2 A meteor is a piece of rock or dust that burns up in the atmosphere. A meteorite is a piece of rock that reaches the ground. (2 marks)</p> <p>3 Any two from: stars, galaxies, planets</p> <p>4 6 mark question. Example answers: It takes fractions of a second for light to reach us from objects in orbit around the Earth, such as satellites or the International Space Station. Light takes minutes to reach us from planets close to us in the Solar System, such as Mercury, Venus, Mars, Jupiter. Light takes hours to reach us from distant planets in the Solar System. Light takes years to reach us from stars in the Milky Way galaxy. Our nearest star is about 4 light-years away. Light takes millions of years to reach us from other galaxies.</p>
-------------------	--



Starter	Support/Extension	Resources
<p>What is in the night sky? (10 min) Students list what they can see in the night sky. Then use the interactive resource where students match items in the night sky with their definition. Discuss why these objects are visible.</p>	<p>Support: Suggest ideas and ask students what they have seen.</p> <p>Extension: Students identify reasons why they cannot see things well at night, for example, light pollution, clouds, or buildings.</p> <p>Extension: Discuss if it is possible to tell between planets or stars using a telescope.</p>	<p>Interactive: What is in the night sky?</p>
<p>What is in the sky tonight? (5–10 min) Use a star map to show what is visible in tonight's sky (e.g., from the National Schools Observatory website) or show a current video of Tonight's Sky from Hubble's website. Free downloadable programs such as Celestia and Stellarium make good alternatives.</p>	<p>Support: Show animations of satellites. An access sheet is available with easier text and comprehension questions. Graph paper is useful to give students an idea of one billion.</p> <p>Extension: Discuss different orbits for satellites (vary in height, orientation, uses), for example, geostationary orbits, low polar orbits. Ask students to suggest benefits for scientists of sharing their ideas.</p>	<p>Activity: What is in the Universe?</p> <p>Skill sheet: Converting units</p>
Main	Support/Extension	Resources
<p>What is in the Universe? (20 min) Use the Hubble website image gallery to show objects in the night sky (planets, nebulae – gas clouds where stars form, stars, black holes – remnant of collapsed giant stars, galaxies). Explain how objects fit together to form the Universe. This can be prepared in advance as a slide show with images and titles. Use the activity sheet to reinforce student perception of our place in the Universe.</p>	<p>Support: Provide a diagram for reference.</p> <p>Extension: Students estimate distances in light-time before you provide a list.</p>	<p>Support: Provide the list for students to rank.</p>
Plenary	Support/Extension	Resources
<p>How far are they? (10 min) Students rank objects in order of distance from Earth and matching distances in light-time, for example, Sun (8 light-minutes), Moon (1 light-second), Proxima Centauri (our nearest star, 4 light-years). Planet light-times vary as position in orbit varies, for example, Neptune (4 light-hours ± 8 light-minutes) or Mars about 4–20 light-minutes.</p>	<p>Support: Use Met Office template for satellite model, available from their website.</p> <p>Extension: Model a named satellite.</p>	
Homework	Support/Extension	Resources
<p>Make a model of a satellite identifying solar panels for power, rockets to control direction, communication antenna, and battery for power supply.</p>		

Resources