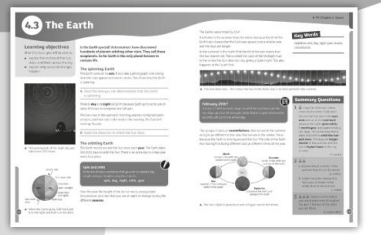
4.3 The Earth



Physics NC link:

- the seasons and the Earth's tilt, day length at different times of the year, in different hemispheres.

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	Describe differences between seasons (Level 3).	2	Starter 1
	Describe the motion of the Sun, stars, and Moon across the sky (Level 4).	B, 1	Starter 2
	Describe patterns in data linking day-length and month (Level 4).		Main 3
Secure	Explain the motion of the Sun, stars, and Moon across the sky (Level 5).	A, B, 1	
	Explain why seasonal changes happen (Level 6).		Main 1, Main 2
	Use data to show the effect of the Earth's tilt on temperature and day-length (Level 5).		Main 3
Extending	Predict the effect of the Earth's tilt on temperature and day-length (Level 7).		Main 3
	Predict how seasons would be different if there were no tilt (Level 7).	3	Plenary 2
	Interpret data to predict how the Earth's tilt affects temperature and day-length (Level 7).		Main 3

Maths
The student-book activity allows students to carry out simple calculations to work out the occurrence of a leap year.

During the activity students extract and interpret information from charts, graphs, and tables. They also represent changes in temperature and day-length with changes in season graphically.

In order to answer questions, students must interpret graphs comparing day-length, temperature, and season.

Literacy
The student-book activity asks students to summarise information using key words.

Students explain to each other phenomena caused by the moving Earth.

For homework students write an account of changes experienced travelling from the equator to the North Pole.

APP
Use of globes, paper Pole Stars, and thermofilm to explain phenomena when explaining the seasons (AF1).

Students display tabulated data as graphs to show trends and patterns (AF3).

Key Words
exoplanet, axis, day, night, year, season, constellation

Answers from the student book

In-text questions	**A** Take a picture of the night sky over many hours. The stars make circular tracks. **B** east
Activity	**Spin and orbit** For example, one day is the time it takes for the Earth to spin once. The half of the Earth where sunlight does not reach is night. One year is the time it takes the Earth to orbit the Sun once. **February 29th?**
Summary questions	**1** east, west, spins, year, orbit the Sun, longer, higher (7 marks) **2 a** It is hotter because the days are longer so the Sun warms the Earth for longer. The rays from the Sun are more concentrated than they are in winter. (2 marks) **b** The Sun is lower in the sky in the winter so shadows are longer. (1 mark) **3** 6 mark question. Example answers: You would not have seasons. Days and nights would be equal length throughout the year. Shadow-length at noon would be the same throughout the year. The height of the Sun in the sky at noon would be the same throughout the year. There would be no difference between the angle at which the Sun's rays hit the Earth at different times of the year. Temperature changes depend on the Sun's rays spreading out over a bigger area in the winter than the summer.

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Starter	Support/Extension	Resources
An alternative question-led lesson is also available. **Different seasons** (5 min) Students list differences in seasons, for example, day-length, position of Sun, and weather. Students suggest why changes happen. **The Pole Star** (5 min) Discuss navigation without a compass. The North Pole always points towards the Pole Star because Earth tilts that way. Use a video clip from the Internet to show how to find the Pole Star and navigate using it.	**Support**: Students identify differences in day-length and temperature. **Extension**: Students suggest differences on the same date in different parts of the Earth.	**Question-led lesson**: The Earth
Main	**Support/Extension**	**Resources**
Why we have seasons (15 min) Ensure students know the Earth always tilts towards the Pole Star, not towards the Sun. Use a paper star on a wall as the Pole Star. Move a globe (Earth) to tilt towards this star as it orbits around a central lamp (Sun). The North Pole tilts towards the Sun for part of the year only. Add a sticker on the globe to show the UK. Students should identify when the UK has winter and summer, and predict changes in day-length. **Seasons and temperature** (10 min) Students may think winter is cooler because the Earth is further away from the Sun but it is because the Sun's rays spread over a larger area when Earth tilts away from the Sun. Stick a 1-cm wide strip of thermofilm from pole to pole, including the UK. Tilt the globe towards the lamp. The thermofilm by the UK warms up changing colour (summer). Tilt the globe away from the lamp, light spreads over a larger area and the thermofilm is cooler (winter). It is important to keep the separation of the lamp and section of the globe the same. **The seasons** (20 min) Students complete questions on the activity sheet.	**Extension**: Students design their own model on paper to show this idea. **Support**: A support sheet is provided with labelled graph grids and fewer sets of data.	**Activity**: The seasons
Plenary	**Support/Extension**	**Resources**
The Sun and the seasons (5 min) Students complete the gap fill on the interactive resource to explain how seasons occur. **A changing tilt** (5 min) Students predict what would be different if Earth was not tilted (we would still be cooler than the equator but day-length/temperature would be the same all year).	**Support**: Set as cloze exercise. **Extension**: Students draw diagrams explaining why some countries are cooler. **Support**: Structure using questions with yes/no answers. **Extension**: Predict changes if Earth's tilt were greater.	**Interactive**: The Sun and the seasons
Homework		
Give students the temperature and day-length in a particular month for four countries between the equator and the North Pole. They write an account or postcards describing changes from the point of view of a tourist.		