Earth and Sky teacher guide

Year 7 Science | Projected demonstration and paper responses

Students use the three-page worksheet while you control the model. Use pages 1 and 2 for the 57-minute introductory lesson, then page 3 for a 20–30 minute follow-up investigation.

Learning intention Explain day and night, distinguish a day from a year, and connect Earth's tilt with seasonal daylight changes.

Success criteria Students can name the two motions, explain night using sunlight, and use daylight observations to explain opposite seasons.

Open https://earth-sky-lab.phillips-david-t.chatgpt.site

Before class Open the site and sign in. Select Earth if the World selector is shown. Press Reset Earth. Keep Melbourne at 37.8° S, tilt 23.4°, solar day 24 hours and year 365.2 Earth days. Use 360° panorama first; switch to 3D later if useful. Students need a pencil and the worksheet only.

Introductory lesson

Time	On the screen and in discussion	Student work
0–5 min	Ask what makes a day and what makes a year. Accept predictions before correcting them. Explain rotation, axis and orbit with the labelled views.	Read page 1 and begin Q1.
5–18 min	Choose A day in 10 seconds and Play. Follow one point through light and dark; pause. Use the local time slider to show morning, noon and night. Point out the fixed Earth-hour unit.	Complete Q1–4.
18–24 min	Ask whether a Moon is needed for night. Trace the side facing away from the Sun. Revisit any claim that the Sun goes around Earth each day.	Answer Q5; rehearse an explanation with a partner.
24–34 min	Choose A year in 24 seconds and Play. Point to the orbit and the rotating planet. Pause after roughly one circuit. Keep day and year distinct.	Complete Q6.
34–48 min	Jump to June solstice, then December solstice. Pause at each. Read daylight, compare the local Sun path, and identify the hemisphere leaning towards the Sun. The axis stays parallel.	Record Q7 and answer Q8–10.
48–57 min	Ask: What causes night? Which motion makes a year? Why is December warmer than June in Melbourne? Sample explanations and correct misconceptions.	Revise one answer and explain it aloud.

Support Say the explanation aloud before writing. Supply the words rotates, axis, faces, sunlight, orbit and tilt. Let students point to a diagram while explaining.

Extend Ask why changing rotation speed would change day length but need not change the time for one orbit.

Follow up parameter tests

Before each test, take predictions without displaying the result. Keep the site paused while reading values. Record the actual displayed values; solstice labels are approximate model dates.

Test	Controls and observations	Expected reasoning
1 No tilt 10–12 min	Reset Earth. Use June solstice and December solstice to repeat the usual-tilt baseline. Set axial tilt to 0°. Repeat those two positions at the same latitude.	Daylight becomes approximately 12 hours in both cases. With circular orbits and no tilt, this model has no tilt-driven seasonal change in sunlight.
2 Longer day 10–12 min	Reset Earth. Jump to December solstice and note 24-hour-day readings. Open Experiment with time & the Moon. Set Solar day to 48 hours. Jump to December solstice again so the view returns to noon. Keep the year control unchanged.	Noon changes from 12:00 to 24:00. Daylight roughly doubles in Earth hours. An orbit takes the same Earth time, so about half as many solar days fit into a year.
Optional 5 min	Restore Earth defaults. Compare Melbourne with Equator at the same two solstices, or select Earth and then Mars in World and compare the parameter readouts.	Latitude changes the observation point; it does not change the planet's tilt. Compare one parameter at a time.

Answer guide

1–5 Shade Earth's half facing away from the Sun. A has day; B has night. One day and night cycle takes about 24 Earth hours. Earth's rotation makes the Sun appear to move across the sky and carries a place into and out of sunlight. Disagree with the Moon claim: ordinary night occurs on the side facing away from the Sun.

6 Rotation: Earth spins about its axis, about 24 hours. Orbit: Earth travels around the Sun, about 365 days (365.25 is also suitable). One complete orbit is one year.

7–10 At Melbourne's latitude, the model shows roughly 9 h 23 min daylight in June and 14 h 37 min in December. June is winter and December is summer. The northern hemisphere has winter during Melbourne's summer. The southern hemisphere leans towards the Sun in December: longer daylight and more direct sunlight increase received solar energy. The axis stays pointing in approximately the same direction; it does not flip.

11 At 0° tilt, record approximately 12 hours in June and December. With no seasonal change in tilt towards the Sun, this circular-orbit model loses its seasonal daylight difference.

12–14 Predictions vary. With the December position held approximately constant: 24-hour day, noon 12:00, daylight about 14 h 37 min, 365.2 solar days/year; 48-hour day, noon 24:00, daylight about 29 h 14 min, 182.6 solar days/year. An orbit still takes about 365.2 standard Earth days. Change the Year setting to change the orbit's duration.

Points to keep accurate

A day is about 24 hours here; Earth's exact spin relative to distant stars is about 23 h 56 min. Avoid introducing that distinction before students can separate rotation from orbit. Seasons are not caused by Earth's changing distance from the Sun. Model month labels are scaled teaching labels, and temperature is illustrative rather than weather. Keep the worksheet focused on the stated concepts.