

Earth, day, seasons and orbits

Grade 6 science (Year 7 · Class 6) · Lesson

Quick answer: The solar system is the Sun with the eight planets that orbit it, held in place by the Sun's gravity. The Earth spins once in 24 hours, giving day and night, and orbits the Sun in about 365 days. Its axis is tilted by 23.5°, and this tilt, not distance, causes the seasons.

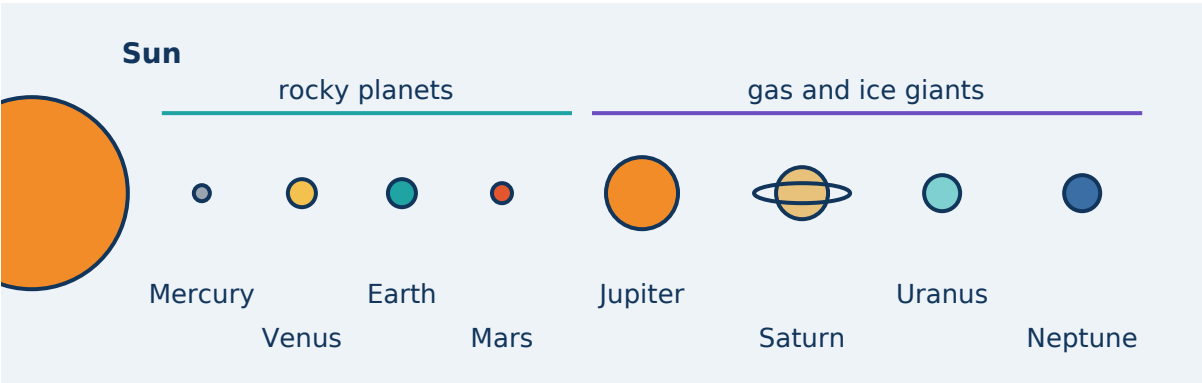
Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-ESS1-2

What is in the solar system?

The solar system is the Sun and everything that travels around it. The Sun is a star, a huge ball of hot gas that gives out light and heat. Eight planets orbit the Sun, together with moons, dwarf planets, asteroids and comets.

Definition

An **orbit** is the curved path of one object around another. The Earth **rotates** (spins) on its axis and **revolves** (orbits) around the Sun.



The planets in order from the Sun (sizes and distances not to scale).

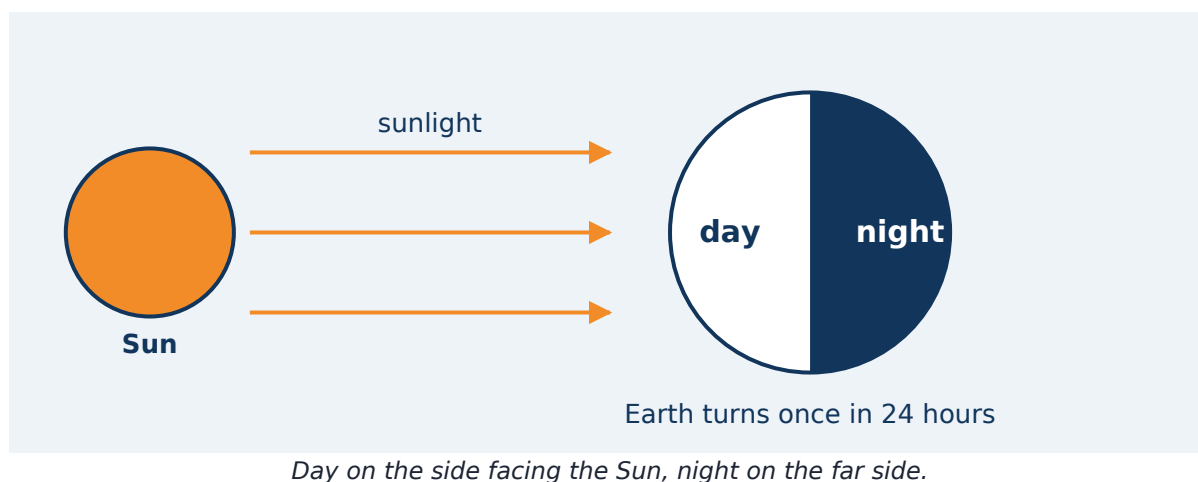
Planet	Type	Time for one orbit
Mercury	Rocky	88 days
Venus	Rocky	225 days
Earth	Rocky	365 days
Mars	Rocky	687 days
Jupiter	Gas giant	11.9 years
Saturn	Gas giant	29.5 years
Uranus	Ice giant	84 years
Neptune	Ice giant	165 years

The farther a planet is from the Sun, the longer its journey takes. Earth is about 150 million km

from the Sun. Light covers that distance in about 500 seconds, or 8 minutes 20 seconds.

Why do we have day and night?

The Sun lights only half of the Earth at any moment. The Earth spins once every 24 hours, so a place is carried into the sunlit half (day) and then into the dark half (night). The Sun does not move across the sky; we move. The Earth spins from west to east, which is why the Sun appears to rise in the east.



Key law

One full rotation takes 24 hours, so the Earth turns **15° every hour** ($360^\circ \div 24 \text{ h}$).

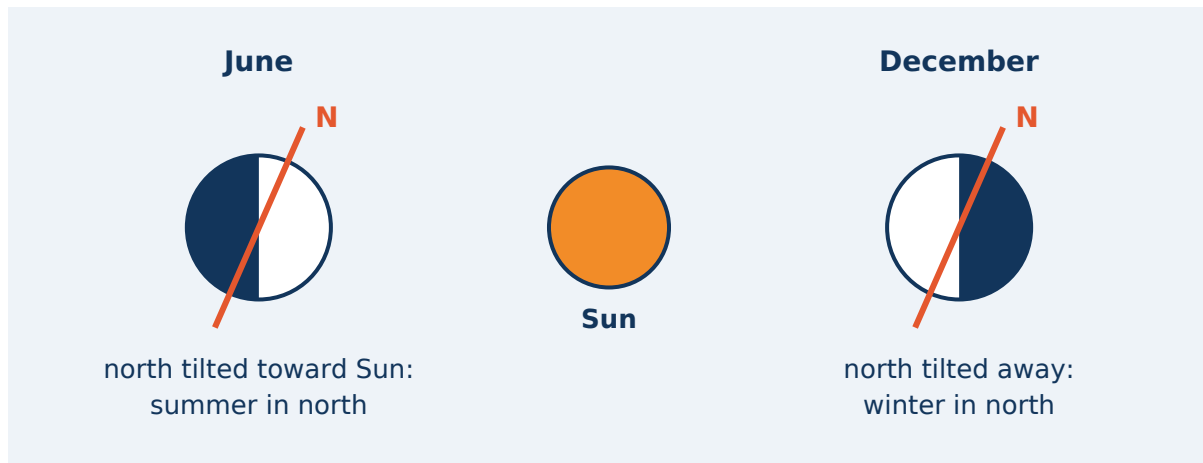
Worked example 1

Fatima in Dubai is at 55° east and Liam in Dublin is at 6° west. The difference is 61°. How big is the time difference?

Rate: $360^\circ \div 24 \text{ h} = 15^\circ$ per hour. Time: $61^\circ \div 15^\circ \text{ per hour} = 4.07 \text{ h}$. **About 4 hours; Dubai is ahead.**

Why do we have seasons?

The axis of the Earth is tilted by 23.5°. In June the northern half leans toward the Sun, so the Sun climbs high, the days are long and sunlight is concentrated: it is summer in the north and winter in the south. Six months later the northern half leans away and the pattern reverses. Near the equator the Sun is always high, so the seasons are weak and day length stays close to 12 hours.



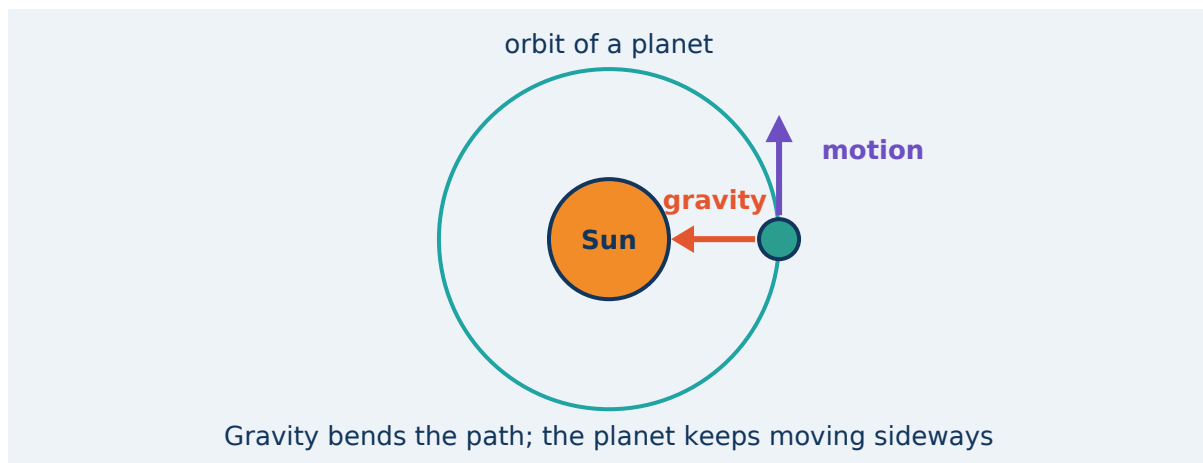
Seasons come from the tilt of the axis, not from the distance to the Sun.

Common mistake

Seasons are not caused by Earth being closer to the Sun in summer. In fact the Earth is closest to the Sun in early January, when it is winter in the north.

What keeps the planets in orbit?

Gravity from the Sun pulls every planet toward it. A planet also moves sideways at great speed. Gravity keeps bending its path inward, so the planet curves around the Sun instead of flying away. If gravity stopped, the planet would move off in a straight line. If the planet stopped moving sideways, it would fall into the Sun.



Gravity bends the path; the planet keeps moving sideways

Gravity pulls inward while the planet moves along its path.

Worked example 2

Hiroshi is 12 years old. Mercury orbits the Sun in 88 days. How many Mercury years is that?

Days lived: $12 \times 365 = 4380$ days. Mercury years: $4380 \div 88 = 49.8$. **About 50 Mercury years.**

Lina's tip

Use your fist as the Sun and a ball as the Earth. Spin the ball for day and night, then walk it around your fist with the axis tilted for the seasons.

Key points to remember

- The Earth rotates once in 24 hours (15° per hour) and orbits the Sun in about 365 days.
- The Earth's axis is tilted by 23.5° , which causes the seasons.
- The Sun's gravity keeps the planets in orbit.
- Earth is about 150 million km from the Sun; light takes about 500 s to arrive.
- Eight planets: four rocky inner planets and four giants.

Earth, day, seasons and orbits: frequently asked questions

Why does the Earth have day and night?

The Earth spins on its axis once every 24 hours. The half facing the Sun has day while the other half has night. The Sun only seems to move across the sky because we are turning.

What causes the seasons?

The tilt of the Earth's axis by 23.5° causes the seasons. When a hemisphere leans toward the Sun it receives more direct sunlight and longer days, so it has summer. The distance to the Sun is not the cause.

What keeps the planets in orbit around the Sun?

The Sun's gravity pulls planets inward, while their sideways motion carries them forward. The two together make a curved path around the Sun. Without gravity a planet would fly off in a straight line.

How many planets are in the solar system?

There are eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. The first four are small and rocky, and the last four are large giants made mostly of gas and ice.

How long does Earth take to orbit the Sun?

The Earth takes about 365 days to orbit the Sun once, which is one year. It takes 24 hours to spin once on its axis, which is one day. Planets farther out take longer to orbit.