

The Universe and the Solar System

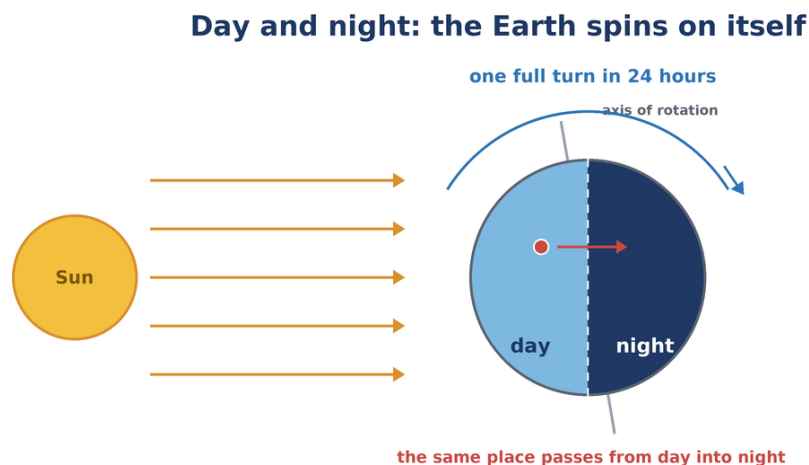
Printable revision sheet — Galaxscia

LEVEL 1

Day and night: the Earth spins on itself

The Earth spins on itself around an imaginary axis: this is **rotation**. It makes one complete turn in **24 hours**, that is one day.

At every moment, one half of the Earth is lit by the Sun (this is **day**) while the other half is in shadow (this is **night**). It is the rotation of the Earth, and not the movement of the Sun, that explains the alternation of day and night.



The Sun lights only one half of the Earth at a time.
It is the rotation of the Earth, not the movement of the Sun, that makes day and night alternate.

Key points — revision questions

- What is the rotation of the Earth? How long does it take?
- What causes the alternation of day and night?

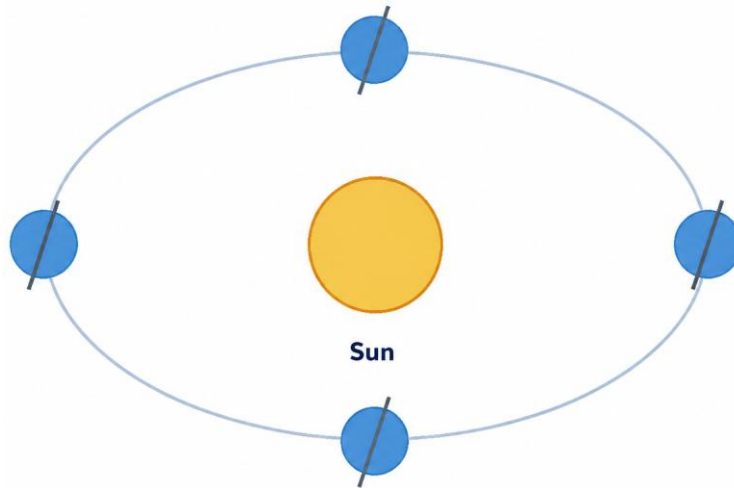
LEVEL 2

The year and the seasons: the Earth travels around the Sun

As well as spinning on itself, the Earth travels **around the Sun**: this is **revolution**. It makes one complete turn in **1 year** (about 365 days).

Because the Earth's axis is slightly tilted, the Sun's rays do not strike the surface in the same way throughout the year. This is what explains the **seasons**: spring, summer, autumn, winter.

Revolution and seasons



The tilt of Earth's axis explains the seasons.

Key points — revision questions

What is the revolution of the Earth? How long does it take?

Why are there seasons on Earth?

LEVEL 3

The apparent movement of the Sun and the stars

From the Earth, we get the impression that the **Sun moves across the sky**: it rises in the east, climbs in the sky, then sets in the west. In reality it is the Earth that turns: this movement is therefore **apparent**.

During the day, the **shadow** of an object (such as a stick planted in the ground, called a *gnomon*) changes in length and in direction.

At night, the **stars** also seem to move slowly across the sky, for the same reason.

The phases of the Moon

The Moon travels around the Earth. It does not produce light: it is lit by the Sun. Depending on the **position** of the Moon relative to the Earth and the Sun, we see a larger or smaller part of its lit face: these are the **phases of the Moon** (new moon, first quarter, full moon, last quarter).

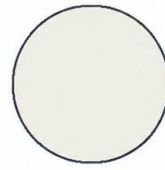
Main phases of the Moon



New Moon



First Quarter



Full Moon



Last Quarter

The Moon does not produce its own light: it reflects sunlight.

Key points — revision questions

In which direction does the Sun rise? In which direction does it set?

Why do we say that the movement of the Sun across the sky is "apparent"?

How does the shadow of a stick change during the day?

Does the Moon produce its own light?

What explains the different phases of the Moon?

Name the four main phases of the Moon.

LEVEL 4

The Earth in the Solar System

The Earth is part of the **Solar System**: a star, the **Sun**, around which several **planets** orbit.

The **Sun** is a **star**: it **produces its own light** (a primary source, see the **Light** lesson). The **planets** do not produce light: we see them because they are **lit by the Sun**.

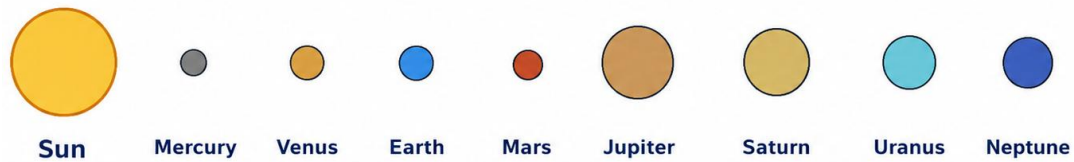
The Solar System has **8 planets**. Starting from the Sun:

4 **terrestrial planets** (small and rocky): **Mercury, Venus, the Earth, Mars**;

4 **gas planets** (giants): **Jupiter, Saturn, Uranus, Neptune**.

The **Earth** is the **3rd planet** out from the Sun. A planet can have one or more **satellites**: the **Moon** is the Earth's satellite.

The Solar System



4 terrestrial planets | 4 giant planets

Why is life possible on Earth?

Among all these planets, the Earth brings together **conditions favourable to life** that are rare in the Solar System:

a **temperature** neither too hot nor too cold, which allows **liquid water** to exist;

an **atmosphere** containing oxygen, the gas needed for breathing (see the **Atmosphere** lesson).

Further still: galaxies and the Universe

Our Solar System is only a very small part of something far larger. It sits in a **galaxy** — a huge grouping of stars — called the **Milky Way**. And the **Universe** contains **billions of galaxies**.

Key points — revision questions

What is the Solar System made of?

Why do we say that the Sun is a star and the Earth a planet?

How many planets are there? What is the Earth's position?

What is the difference between a planet and a satellite?

Name two conditions that make life possible on Earth.

Which galaxy is the Solar System in, and what does the Universe contain?

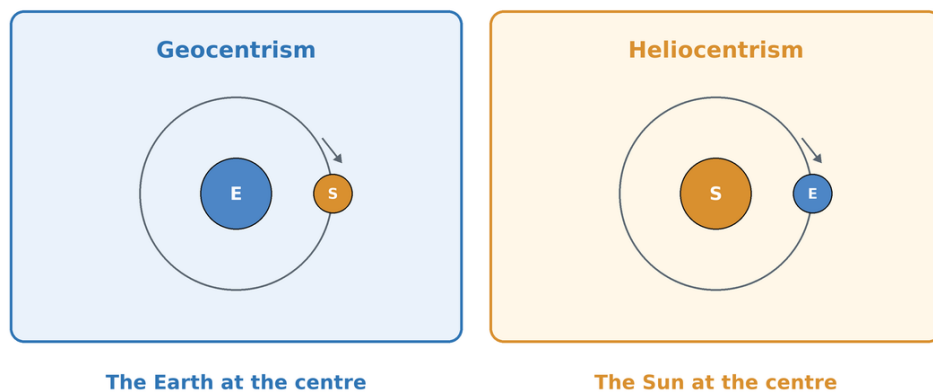
LEVEL 5

Two models in history: geocentrism and heliocentrism

For a long time, scholars thought that the Earth was motionless at the centre of the Universe and that the Sun travelled around it: this is the **geocentric** model ("the Earth at the centre").

Later, thanks to observations, scientists understood that it is the Earth that travels around the Sun: this is the **heliocentric** model ("the Sun at the centre"), the model accepted today.

Two models in history



The heliocentric model is the one accepted today.

E = Earth S = Sun

This example shows how science moves forward: we observe, we propose a model, then we correct it when new observations contradict it.

Key points — revision questions

What does "geocentric" mean? And "heliocentric"?

Which model is accepted today?