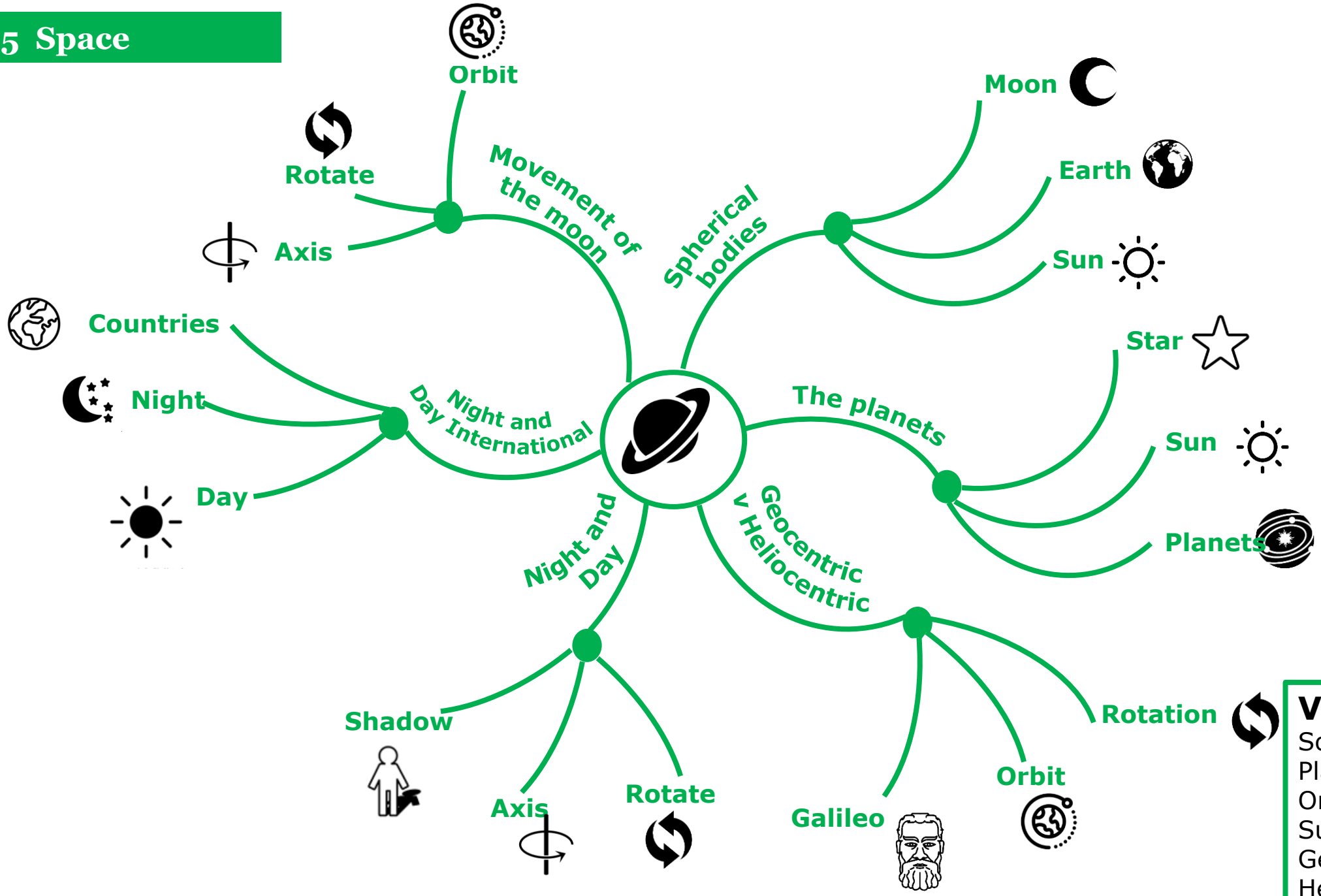
Year 5 Space



Vocabulary

Solar system
Planet
Orbit
Sun
Geocentric
Heliocentric

Year 5 Space – Step 1 The Solar system

Notes and guidance

In this small step, children learn about the Solar System. The Solar System is made up of the Sun, eight planets and their moons and millions of other smaller celestial bodies. It is important to note that children have not studied space and the Solar System before. As a result, they may have a limited understanding of the key terms and what makes up the Solar System.

This step introduces the enquiry question for this block. Children complete a research enquiry to understand how our ideas about the Solar System have changed over time. Children look at the views of different scientists and mathematicians. They compare these views to current ideas about the Solar System.

Key questions

- What makes up the Solar System?
- What is a star?
- What is the name of the star in the Solar System?
- What is a satellite?
- What is the name of the natural satellite that orbits Earth?
- How many planets are there in the Solar System?

Enquiry question

- How have ideas about the Solar System changed over time?

Things to look out for

- Children may think that there is more than one star in the Solar System. Clarify that the only star in the Solar System is the Sun.
- Children may think that Pluto is a planet. Explain that Pluto was reclassified as a dwarf planet because it is not big enough to be regarded as a planet.

National curriculum links

- Describe the Sun, Earth and Moon as approximately spherical bodies.
- **Working scientifically** – Identifying scientific evidence that has been used to support or refute ideas or arguments.

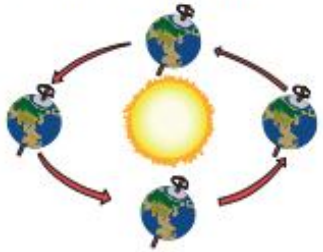
Year 5 Space – Step 1 The Solar system

Key vocabulary

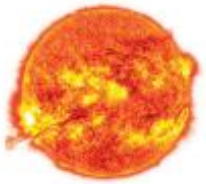
- **Solar System** – the Sun and the other bodies that orbit it

- **planets** – a roughly spherical object which orbits a star

- **orbit** – the path an object takes around another object because of gravity



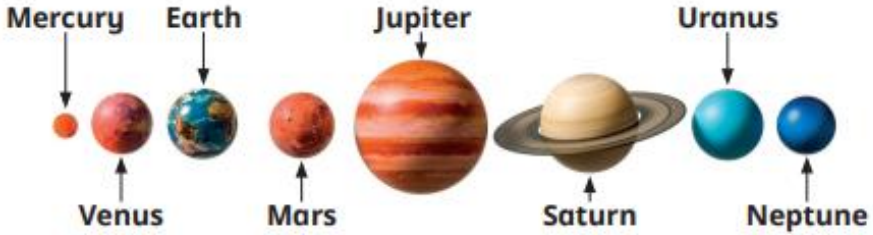
- **Sun** – the star at the centre of our Solar System



Practical ideas

- A mnemonic to remember the order of the planets is My (Mercury) Very (Venus) Easy (Earth) Method (Mars) Just (Jupiter) Speeds (Saturn) Up (Uranus) Nothing (Neptune).

  Ask children to create their own mnemonic to remember the order of the planets.



- Children begin their enquiry research in pairs to create a number of different true or false statements about the Solar System.

Factual knowledge

- The Sun, plants and moons are approximately spherical bodies.
- The Solar System is a collection of planets, moons and the Sun.
- The Sun is a star, which releases heat and light.
- The Sun is at the centre of the Solar System.

Year 5 Space – Step 2 The planets

Notes and guidance

In this small step, children learn about the eight planets in the Solar System and their features. Children learn that all the planets in the Solar System orbit the Sun. They look at the different surfaces of the planets. They learn that the first four planets from the Sun have a solid surface. The other four planets are made mostly of gas and do not have a solid surface.

Children investigate the enquiry question in this step. They look at how the planets orbit the Sun and, in later steps, compare this to previous ideas about the movement of planets. They should be given opportunities to develop their thinking and reasoning.

Key questions

- How many planets are there in the Solar System?
- What is the order of the planets?
- What do the planets orbit in the Solar System?
- What is similar about the first four planets?

  What is different?
- What is similar about the last four planets?

  What is different?

Enquiry question

- How have ideas about the Solar System changed over time?

Things to look out for

- Children may believe that Earth is larger than the Sun.
- Children may think that all planets have a hard rocky surface like Earth.
- Children may believe that Earth is the only planet with a moon. Earth has one moon but several other planets have more than one moon. For example, Uranus has 28 known moons.

National curriculum links

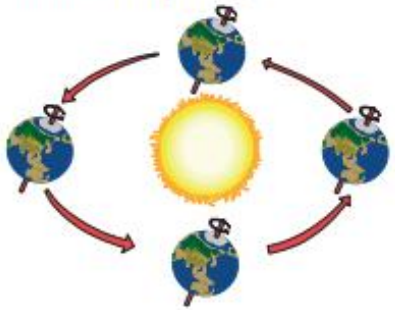
- Describe the Sun, Earth and Moon as approximately spherical bodies.
- **Working scientifically** – Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time (non-statutory).

Year 5 Space – Step 2 The planets

Key vocabulary

- **planet** – a roughly spherical object which orbits a star

- **orbit** – the path an object takes around another object because of gravity



- **Pluto** – a former planet, that was reclassified as a dwarf planet

- **celestial body** – an object in space

Practical ideas

- Split the class into eight groups.

  Give each group one planet to focus on.

  Ask each group to create a large-scale drawing of their planet to add to a class display.

  Children use secondary sources to research facts about their planet, such as its appearance, surface, temperature and how far it is from the Sun.

  Ask children what they notice about the first four planets from the Sun and the last four planets from the Sun regarding surface, appearance, temperature and distance from the Sun.

Factual knowledge

- There are eight planets that orbit the Sun.
- Mercury, Venus, Earth and Mars all have a solid surface.
- Jupiter, Saturn, Uranus and Neptune are made mostly of gas and do not have a solid surface.
- Pluto is classified as a dwarf planet.

Year 5 Space – Step 3 Modelling

Notes and guidance

In this small step, children learn how to use models to represent the Solar System and planets. It is important that children recognise that models have advantages and disadvantages, but can be used to visualise concepts that are difficult to understand.

Children continue to explore the enquiry question in this step to further their understanding of the Solar System. They do this by using knowledge from the previous step to create their own models of the Solar System. They should then be able to describe their model and explain why they have created it as they have.

Key questions

- What is a model in science?
- Why are models used in science?
- What does the model of the Solar System help to show?
- What are the advantages of the Solar System model?
- What are the disadvantages of the Solar System model?
- Which model is a better representation of the Solar System and why?

Enquiry question

- How have ideas about the Solar System changed over time?

Things to look out for

- Children may believe that all planets are the same size.
- Children may think that all planets are the same distance from the Sun.
- Children may believe that the Sun is the same size as the planets.

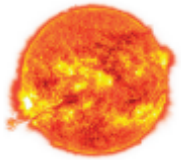
National curriculum links

- Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.
- **Working scientifically** – Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

Year 5 Space – Step 3 Modelling

Key vocabulary

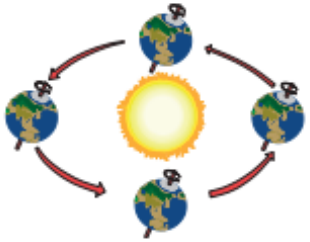
- **Sun** – the star at the centre of our Solar System



- **planet** – a roughly spherical object which orbits a star

- **model** – a representation of an idea or process

- **orbit** – the path an object takes around another object because of gravity



Practical ideas

- Ask children to work in small groups to create a model of the Solar System.

  Ask children to use spherical foods or different sized balls from the PE cupboard to represent the Sun and the eight planets. Children can then use this equipment to model the motion of the planets relative to the Sun.

  Children need to consider the size of planets carefully when making their model. The representation of the Sun should be larger than that of the planets.

Factual knowledge

- The Solar System is a collection of celestial bodies, including the planets, moons and the Sun.
- Earth and the other planets orbit the Sun.
- Scientific models are representations of ideas or processes.
- Models can be created in different ways to represent the Solar System.

Year 5 Space – Step 4 Motion of the Earth and planets

Notes and guidance

In this small step, children learn about the movement of Earth and the other planets in the Solar System. This includes how long it takes each planet to orbit the Sun and why.

Children continue to explore the enquiry question in this step. They should be given opportunities to develop their thinking regarding motion of the planets and the heliocentric model.

Children should explain the movement of the planets around the Sun with reference to key vocabulary such as gravity, gravitational pull and the heliocentric model. They should understand that, in the Solar System, the Sun has the greatest gravitational pull. This is why all planets orbit the Sun.

Key questions

- What do Earth and the other planets in the Solar System orbit?
- Why do the planets stay in orbit around the Sun?
- Why does Mercury take the shortest time to orbit the Sun?
- Why does Neptune take the longest time to orbit the Sun?
- What would happen if the Sun was not present in the Solar System?

Enquiry question

- How have ideas about the Solar System changed over time?

Things to look out for

- Children may believe that it takes every planet about 365 days to orbit the Sun. Explain that each planet takes a different number of days or years to orbit the Sun. For example, it takes Earth about 365 days, but Jupiter takes the equivalent of 12 Earth years to orbit the Sun. Explain to children that each planet has a different length day and year.

National curriculum links

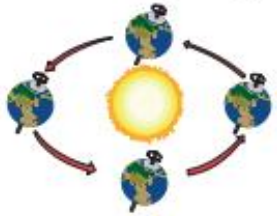
- Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.
- **Working scientifically** – Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.

Year 5 Space – Step 4 Motion of the Earth and planets

Key vocabulary

- **gravity** – a non-contact force caused by objects with mass pulling each other

- **orbit** – the path an object takes around another object because of gravity



- **heliocentric model** – a model that puts the Sun at the centre of the Solar System

- **geocentric model** – a model that puts Earth at the centre of the Solar System

Practical ideas

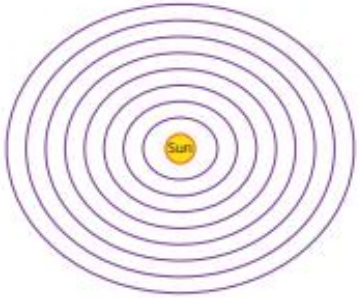
- Ask a child to stand in the the middle of the playground.

  This child represents the Sun in the centre of the Solar System.

  Draw eight rings around that child to represent the positioning and orbit paths of the eight planets.

  Ask children to orbit the Sun in the centre.

  Children should recognise that the further a planet is from the Sun, the more time it takes to complete one full orbit.



Factual knowledge

- The Sun is the largest object in the Solar System and has the greatest gravitational pull. This keeps all the planets in orbit around the Sun.
- Earth takes about 365 days, or one year, to complete one full orbit.
- Other planets take different amounts of time to complete a full orbit around the Sun. This is relative to their distance from the Sun.

Year 5 Space – Step 5 The solar system – ideas over time

Notes and guidance

In this small step, children explore how ideas about the Solar System have changed over time. They learn how different scientists and mathematicians have contributed to our understanding of the Solar System, including the positioning of the Sun and planets.

In this step, children research the work of Aristotle, Ptolemy, Copernicus, Galileo and Newton. Children should be given the opportunity to present their findings through presentations, discussions and written responses.

Key questions

- Who was Aristotle/Ptolemy/Copernicus and what ideas did he have about the Solar System?
- What are the similarities and differences between the geocentric and heliocentric models?
- How did Galileo and Newton improve the understanding of the Solar System?

Enquiry question

- How have ideas about the Solar System changed over time?

Things to look out for

- Children may believe that the planets cannot be seen without a telescope.
- Children may believe that Earth is flat. Explain that people once thought this, but now we know that Earth is spherical.
- Children may think that Earth is at the centre of the Solar System. Explain that the Sun is at the centre of the Solar System with the eight planets orbiting it.

National curriculum links

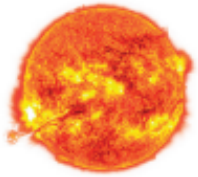
- Describe the movement of the Earth, and other planets relative to the Sun in the solar system.
- **Working scientifically** – Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.

Year 5 Space – Step 5 The solar system – ideas over time

Key vocabulary

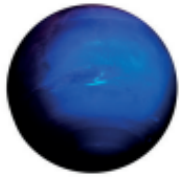
- **geocentric model** – a model that puts Earth at the centre of the Solar System

- **heliocentric model** – a model that puts the Sun at the centre of the Solar System



- **model** – a representation of an idea or process

- **planet** – a roughly spherical object which orbits a star



Practical ideas

- Put children into small groups. Ask them to create a timeline showing how scientists and mathematicians have contributed to the changes in ideas about the Solar System.

  Children present their timelines to the rest of the class and compare.

- Ask children to work in groups and assign each group a scientist to research. The children become experts on their given scientist and present their work to the rest of the class.

Factual knowledge

- Different scientists and mathematicians have contributed to our understanding of the Solar System over time.
- It was once thought that Earth was at the centre of the Solar System.
- Through scientific advances, we now know that the Sun is at the centre of the Solar System.

Year 5 Space – Step 6 Planet Earth

Notes and guidance

In this small step, children look at planet Earth. Children learn that Earth completes a full rotation around its axis once every 24 hours. This is why we have a 24-hour day. Clarify to children that the Sun does not move. It is Earth that moves and rotates. Demonstrate to children how Earth rotates around its axis to challenge any misconceptions that they may have.

Within this step, there is an opportunity for children to identify how planet Earth is changing. Children can find out what global warming is and the effects it is having on our planet. They do not need to discuss the concept in detail in this step because they will explore the impacts of global warming further in the next block.

Key questions

- What does Earth orbit?
- What is Earth's axis?
- What does it mean that "Earth rotates around its axis"?
- How long does it take Earth to rotate once around its axis?
- What are the names of the four seasons on Earth?
- Why do the seasons occur on Earth?

Enquiry question

- How have ideas about the Solar System changed over time?

Things to look out for

- Children may believe that the Sun rotates around the Earth.
- Children may think that Earth is the largest object in the Solar System, not the Sun.
- Children may think that other planets can support life. Explain that currently Earth is the only planet in the Solar System that is known to be able to support life.

National curriculum links

- Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky.
- **Working scientifically** – Identifying scientific evidence that has been used to support or refute ideas or arguments.

Year 5 Space – Step 6 Planet Earth

Key vocabulary

rotate – to spin around an axis

North Pole – the northern point of Earth's axis

South Pole – the southern point of Earth's axis

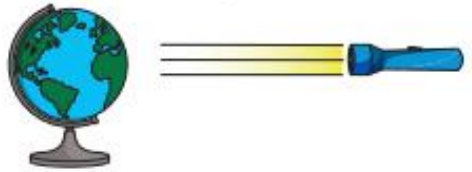
axis – an imaginary line which something rotates around

- **Earth**– the planet that we live on

Practical ideas

- Use a globe to demonstrate Earth's rotation around its axis. Highlight that the axis is slightly tilted. Ask children how long each of Earth's rotations takes and where the axis is, highlighting the North and South Poles.
- Use a globe and torch to explain how seasons occur on planet Earth. The torch represents the Sun.

  Rotate a globe to show how Earth rotates around its axis as it orbits the Sun. When the North Pole tilts toward the Sun, it's summer in the Northern Hemisphere and winter in the Southern Hemisphere.



Factual knowledge

- Earth's axis is an imaginary line that runs from the North to the South Pole.
- Earth rotates once around its axis in a 24-hour period.
- Earth is the only planet known to support plant and animal life.
- The four seasons occur on planet Earth because Earth's axis is tilted.

Year 5 Space – Step 8 Night and Day

Notes and guidance

In this small step, children explore the concept of night and day and how they occur because of the rotation of Earth around its axis.

As in the previous step, it is important to demonstrate to children how night and day occur, to help address any misconceptions that they may have.

By the end of this step, children should understand that it takes Earth 24 hours to rotate around its axis. When Earth rotates, it is day on the side that faces the Sun and night on the side that faces away from the Sun.

Things to look out for

- Children may think that the Sun disappears at night.
- Children may believe that night and day are caused by the Sun moving around Earth. Clarify to children that Earth rotates around its axis and each rotation takes 24 hours.
- Children may think that the Sun appears in the morning then moves across the sky and disappears in the evening. Clarify to them that the Sun does not move, it is Earth that rotates.

Key questions

- How long does it take Earth to rotate around its axis?
- What causes day and night?
- Why don't people in different countries experience day at the same time?
- Why don't people in different countries experience night at the same time?
- What would happen if Earth did not rotate around its axis?

Enquiry question

- How have ideas about the Solar System changed over time?

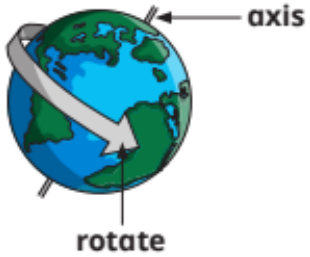
National curriculum links

- Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky.
- **Working scientifically** – Identifying scientific evidence that has been used to support or refute ideas or arguments.

Year 5 Space – Step 8 Night and Day

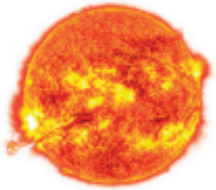
Key vocabulary

- **axis** – an imaginary line which something rotates around
- **rotate** – to spin around an axis



- **Earth** – the planet that we live on

- **Sun** – the star at the centre of our Solar System

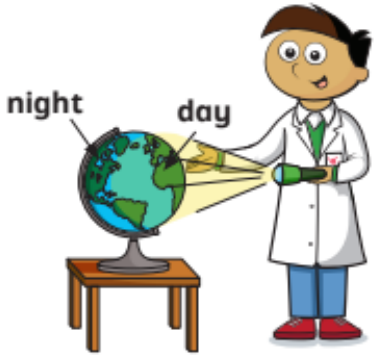


- **night** – when it is dark on the half of Earth that is facing away from the Sun
- **day** – when it is light on the half of Earth that is facing the Sun

Practical ideas

- Use a torch to represent the Sun and a globe that rotates to represent Earth. Shine the torch onto the globe and rotate the globe to demonstrate night and day. The torch should not move.

  Ask children what they notice and why they think night and day occur.



- Ask children to point to countries that would experience night and day, as you rotate the globe. Ask them to explain their reasoning with reference to the rotation of Earth.

Factual knowledge

- Earth rotates around its axis.
- It takes 24 hours for Earth to rotate around its axis and complete one full rotation. This is why one day is 24 hours long.
- It is day on the part of Earth that faces the Sun.
- It is night on the part of Earth that faces away from the Sun.

Year 5 Space – Step 9 The Moon

Notes and guidance

In the final small step in this block, children explore the Moon and its features. This includes what the Moon looks like, its surface and how long it takes to orbit Earth. They learn that other planets have their own moons and some have multiple moons.

It is important that children understand that the Moon orbits Earth and stays in orbit due to the Earth's gravitational pull.

By the end of this step, children should demonstrate their understanding through both written and verbal responses.

Key questions

- What is a satellite?
- What does the Moon orbit?
- How long does the Moon take to orbit Earth?
- How is the Moon able to orbit Earth?
- What is "gravitational pull"?
- Is Earth the only planet with a moon?

Enquiry question

- How have ideas about the Solar System changed over time?

Things to look out for

- Children may believe that the Moon can be seen only during the night.
- Children may think that the Moon emits its own light. Explain that the Moon reflects light from the Sun.
- Children may believe that Earth's Moon is the only moon in the Solar System. Explain that other planets have their own moons because they have a gravitational pull, just like Earth.

National curriculum links

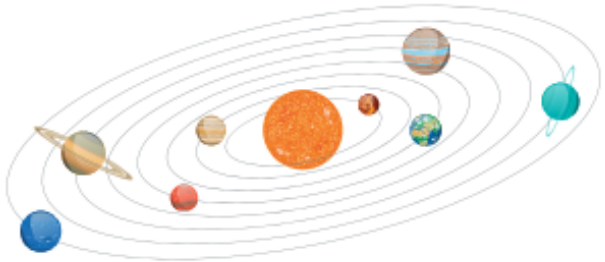
- Describe the movement of the Moon relative to the Earth.
- **Working scientifically** – Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.

Year 5 Space – Step 9 The Moon

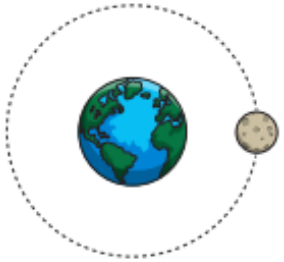
Key vocabulary

- **moon** – a natural satellite that orbits Earth

- **gravitational force** – a non-contact force caused by objects with mass pulling each other



- **orbit** – the path an object takes around another object because of gravity



- **satellite** – an object that orbits a planet or a star

Practical ideas

- Give children some different sized balls.

  Place the children in groups and ask them which size balls they would select for the Sun, Earth and the Moon and why.

  Ask them to use the balls to explain the movement of Earth around the Sun and the movement of the Moon around Earth, with reference to gravitational pull.

- Ask children to create a presentation about the Moon, describing what it is, its features, how long it takes to orbit Earth and why.

Factual knowledge

- Earth has one moon, which takes approximately 27 days to orbit Earth.
- Without Earth's gravitational pull, the Moon would float into space.
- The Moon is not a light source. It reflects light from the Sun.
- Light from the Sun is reflected from the Moon onto Earth.