Portfields Primary School Medium Term Plan

Year Group – **5** Subject - **Science** Topic – **Earth and Space** Term – **Spring 2**

National Curriculum

Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.

Describe the movement of the Moon relative to the Earth.

Describe the Sun, Earth and Moon as approximately spherical bodies.

Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

Non-Statutory

Pupils should be introduced to a model of the Sun and Earth that enables them to explain day and night.

Pupils should learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).

Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses

Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.

Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.

Key Questions

What are the similarities and differences between planets, the moon and the sun?
What is your opinion about the shape of the Earth?
How can we remember the order of the planets?
Why do you think people thought the Earth was at the centre of the Solar System?
What do you notice about the position of the Sun throughout the day?
Which countries have you visited? What time zones are they in?

Technical Questions

What is a sphere?
A three dimensional shape which is symmetrical and round in shape. All of its surface points are at equal distances from the centre. It does not have any faces, corners or edges.

Why are planets spherical?
Gravity pulls everything towards its centre, with the same force, making everything the same distance from the centre, making it spherical.

What are the criteria for being classified as a planet?
- Be roughly spherical
- Orbit the sun
- Be big enough to clear any floating objects
- Not orbit another planet

What shape is the Earth? Why?
An oblate spheroid because it is roughly spherical but it bulges at the equator due to the centrifugal force as a result of it spinning.

How are the planets arranged in the Solar System?
In order of distance from the Sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

What are the sizes of the planets in the Solar System?
In order of size starting with the smallest: Mercury, Mars, Earth, Venus, Neptune, Uranus, Saturn, Jupiter.

What are the planets in the Solar System made of?
The four closest to the Sun (Mercury, Venus, Earth, Mars) are rocky planets.
The four furthest from the Sun (Jupiter, Saturn, Neptune, Uranus) are gas giants.

What is the difference between 'orbit' and 'rotate'?
Orbit = when an object spins around another object.
Rotate = when an object spins on its own axis.

What is the geocentric theory?
The Earth is at the centre of the Solar System and is orbited by the Sun and other planets. This was believed until the 1500s.

What is the heliocentric theory?
The Sun is at the centre of the Solar System and is orbited by the planets. This was published by scientist Nicolaus Copernicus.

How does the position of the Sun change in the sky?
In the mornings and late afternoons, shadows are longer because the Sun is lower in the sky. They are shortest at midday as this is when the Sun appears to be the highest in the sky.

Does the sun move in relation to the Earth?
The Sun does not move, it stays in the same place in relation to the Earth. It appears to move across the sky because the Earth orbits the sun and rotates on its axis.

How does the Earth move?
It revolves (orbits) the Sun. One revolution takes just over 365 days (1 year). It also rotates (spins) on its axis. One rotation takes 24 hours (1 day).

Why do we have seasons?
The Earth's axis runs from the North Pole to the South Pole and is slightly tilted. Parts of the Earth tilted towards the Sun are in summer and those pointed away are in winter.

Why do we have night and day?
The Earth rotates on its axis across a 24-hour period. Parts of the Earth facing the Sun are in daytime and those facing away are in night time.

What are time zones?
The globe is split into 24 different time zones, using imaginary lines called meridians that run from North to South pole.

Why do we have time zones?
Because different parts of the Earth enter day and night at different times due to the rotation of the Earth on its axis.

What are satellites?
Satellites are objects that orbit other objects in space. The Moon is a natural satellite that orbits the Earth.

How does the Moon move in relation to the Earth?
The Moon rotates on its axis and orbits the Earth. The rotation occurs at the same rate as its orbit so we only ever see the same side of the Moon. It takes around 27 days for the moon to complete a full orbit of the Earth.

Why does the moon look different at different times?
The Moon orbits the Earth and the Earth moves through space so different parts of the moon reflect the Sun's light at different times. These different views are called the phases of the Moon and each phase has its own name.

Substantive Knowledge

Understand that beliefs about the shape of the Earth have varied over time and that the Earth is approximately spherical (oblate spheroid) due to gravity.

Understand that spherical bodies called planets are classified by clear criteria.
Know the names of the planets in our Solar System in order from the sun and their approximate relative sizes.

Understand the difference between geocentric and heliocentric models of the Solar System and the scientists that contributed to these.

Know the sun's movement across the sky and the shadows it casts.

Explain how the Earth moves on its axis and in relation to the sun, and how this causes seasons, day and night, and time zones.

Explain how the moon moves on its axis and in relation to the Earth, and how this causes its movement across the sky.

Disciplinary Knowledge

Represent the planets of our Solar System in objects to show their relative size and position.

Identify the time zones countries are in.

Key Vocabulary

Atlas
Day
Day
Earth
Flat
Jupiter
Mars
Mercury
Moon
Neptune
Night
Planet
Saturn
Season
Shadow
Sky
Solar System
Sphere
Sun
Uranus
Venus
Year

Technical Vocabulary

Axis
Equator
Gas giant
Geocentric
Gravity
Heliocentric
Hemisphere
Meridian
Moon phase
North pole
Oblate Spheroid
Orbit
Revolution
Rocky planet
Rotate
South pole
Time zone

Real-Life Links

Observable movement of the sun in the sky and shadows on the ground.

Observable differences in the way the moon looks in the sky.

Different temperatures in different seasons.

Different levels of light at different times of the day and night.

Different time zones when travelling to different places in the world.

Key Scientists

Nicolaus Copernicus
Developed the heliocentric model of the Solar System

Working Scientifically

Understand how different ideas about the shape of the Earth have changed over time due to evidence.

Understand how the geocentric and heliocentric models of the Solar System developed over time due to evidence.

Lesson Breakdown					
Lesson 1	**Lesson 2**	**Lesson 3**	**Lesson 4**	**Lesson 5**	**Lesson 6**
Learning Objective LO to understand how the theories of the shape of the Earth have changed over time. **Success Criteria** I can describe a sphere. I can describe the Sun, Earth and Moon as nearly spherical. I can name different shapes the Earth was thought to be. I can identify scientific evidence that has been used to support or disprove ideas. **Star Knowledge** For a celestial body to be classified as a planet, it has to: - Be roughly spherical - Orbit the sun - Be big enough to clear any floating objects - Not orbit another planet The Earth has been assumed to be different shapes throughout history. It has been proven to be an oblate spheroid (roughly spherical shape) because gravity pulls everything towards the centre. The Earth spins which causes it to bulge at the equator.	**Learning Objective** LO to describe the order and movement of planets relative to the Sun. **Success Criteria** I can order the planets in our Solar System. I can name and describe the features of the planets in our Solar System. I can describe how the planets move in relation to the Sun. **Star Knowledge** Planets arranged in order of distance from the Sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. Planets arranged in order of size starting with the smallest: Mercury, Mars, Earth, Venus, Neptune, Uranus, Saturn, Jupiter.#	**Learning Objective** LO to examine the geocentric and heliocentric theories. **Success Criteria** I can explain how the planets orbit the Sun. I can distinguish between heliocentric and geocentric ideas of planetary movement. I can explain theories of planetary movement in the solar system using evidence. **Star Knowledge** The Sun is at the centre of the Solar System and is orbited by the planets. This is called the heliocentric model and was published by scientist Nicolaus Copernicus.	**Learning Objective** LO to explain how the position and movement of the Earth contributes to seasons and day and night. **Success Criteria** I can explain how the apparent movement of the Sun changes throughout the day. I can explain that seasons are due to the tilt of the Earth on its axis. I can explain that day and night is due to rotation of the Earth. **Star Knowledge** We have seasons because the Earth is tilted on its axis. Parts of the Earth tilted towards the Sun are in summer and those pointed away are in winter. We have day and night because the Earth rotates on its axis across a 24-hour period. Parts of the Earth facing the Sun are in daytime and those facing away are in night time.	**Learning Objective** LO to investigate day and night in different parts of the Earth. **Success Criteria** I can make predictions about night and day in different places on Earth. I can explain why night and day occur at different times in different places on Earth. I can use an atlas to find which time zones countries are in. **Star Knowledge** The globe is split into 24 different time zones, using imaginary lines called meridians that run from North to South pole. We use time zones because different parts of the Earth enter day and night at different times due to the rotation of the Earth on its axis.	**Learning Objective** LO to explain the movement of the Moon. **Success Criteria** I can explain that the Moon orbits the Earth, not the Sun. I can explain how the Moon moves, relative to the Earth. I can explain how the Earth and Moon move, relative to the Sun. **Star Knowledge** The Moon rotates on its axis and orbits the Earth. The rotation occurs at the same rate as its orbit so we only ever see the same side of the Moon. It takes around 27 days for the moon to complete a full orbit of the Earth. The Moon orbits the Earth and the Earth moves through space so different parts of the moon reflect the Sun's light at different times. These different views are called the phases of the Moon and each phase has its own name.