<table>
<tr><th>Year 1 Term Spring 2</th><th>Unit Title: Seasonal Change (revisited throughout the year)</th></tr>
<tr><th>NC Objectives</th><th>Key Knowledge Content</th></tr>
<tr><td rowspan="2">Observe changes across the 4 seasons.

Observe and describe weather associated with the seasons and how day length varies.

Non-statutory notes
Observe and talk about changes in the weather and the seasons.

Pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses.</td><td><u>Context of Study</u>
This unit follows on from work in Reception where pupils study the names of the 4 seasons and look at changes to trees and plants during this time as each season occurs. In year 1 they begin to learn more about the 4 seasons, including the months that fall into each season and the weather patterns they follow. They will learn about the changes through the seasons and how the seasons affect animals and plants. This unit comes before work studied in year 2 about what plants need to grow well and when plants grow best. This unit will be revisited as they study common plants and how seasons affect deciduous and evergreen plants.</td></tr>
<tr><td><u>Knowledge Content</u>
Know that Earth and Space is part of the discipline of physics.
Know that physics is the study of the processes that shape our world and how we use it.

<u>Children already know:</u>
- The names of the 4 seasons
- What happens to trees and plants in each season

Know that there are 4 seasons - Autumn, Winter, Spring and Summer.
Know that the seasons occur in a cycle and that they consist of the following months –</td></tr>
</table>

Make tables and charts about the weather; make displays of what happens in the world around them, including day length, as the seasons change.	 Know how the environment changes in each season. **Autumn** - Leaves change colour and fall from deciduous trees, harvest time, some birds **migrate** (e.g. swallows).  **Winter** - Some animals including hedgehogs and tortoises hibernate throughout Winter, water freezes to ice and many plants stop growing.

	 **Spring** - Flowers begin to grow, associated with rebirth and growth, some baby animals are born (e.g. lambing season).  **Summer** - Flowers and trees are in bloom.  (Timelapse video of seasons - https://vimeo.com/2639782) Know that the length of daylight varies with Winter having the shortest daylight hours and Summer having the longest.

	Know that in the UK the longest day is June 21st (the Summer Solstice) and the shortest day is December 21st (the Winter Solstice). Know that there is equal **daylight** and **night time** at the Spring Equinox (around March 20th) and the Autumn Equinox (around 22nd September). Know that the Earth **orbits** the Sun with one orbit constituting a year of 365/366 days. Know the weather **patterns** associated with each season - **Autumn** - Temperatures start to drop from Summer, overcast, rain **Winter** - Coldest time of year, snow, frosty in the morning, sleet, blizzard, hail **Spring** - Temperatures start to warm up **Summer** - Hottest time of the year, sunshine, generally dry weather but may be thunderstorms Know the differences between types of **precipitation** - hail, rain, snow, sleet.  **<u>SEE SEPARATE SHEETS FOR SEASONAL CHANGE ACTIVITIES</u>** Know the seasonal vocabulary: **<u>January and February</u>**

March and April

May and June

July and August

September and October

November and December

WORKING SCIENTIFICALLY

Know that a **thermometer** is used to measure **temperature**.

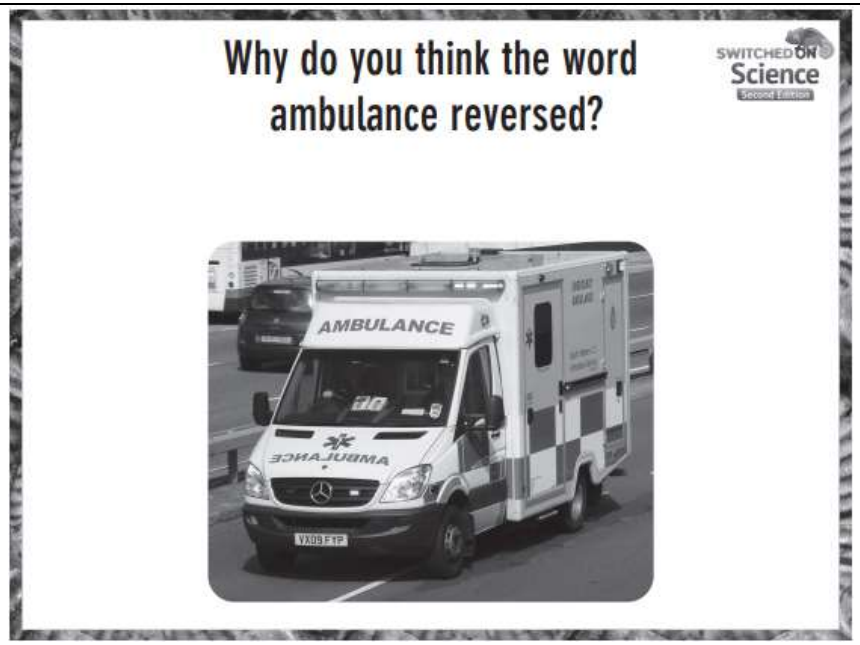
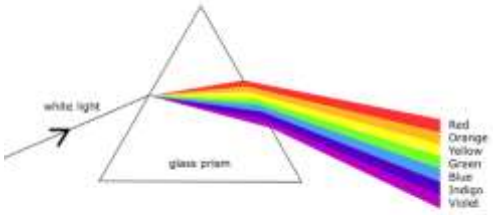
Know how to read a thermometer to find out the temperature outside.

Know that we measure temperature in **degrees Celsius** which is abbreviated to oC.

	Know that when the temperature falls below 0oC then water turns to ice. Know that looking directly at the sun is not safe even when wearing sunglasses. Know that the temperature on earth is affected by the sun. Know that a **forecast** is a **prediction** about future weather.
	<u>STEAM Opportunities</u> - Take weather pictures - Make a journey stick - Collect leaves and order from biggest to smallest - Compare winter and summer temperatures and record them.
	<u>Outcome</u> Topic Test 4 Seasons matching
	<u>Reading Link</u> Tree: seasons come, seasons go
	<u>Scientist/Inventor</u> George James Symons
Approved Resources	BBC Bitesize Switched on Science CGP

Year 3 Term Spring 2	Unit Title: Light
NC Objectives	**Key Knowledge Content**
Recognise that they need light in order to see things and that dark is the absence of light. Notice that light is reflected from surfaces. Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Recognise that shadows are formed when the light from a light source is blocked by an opaque object. Find patterns in the way that the size of shadows change. **Non-statutory notes** Explore what happens when light reflects off a mirror or other reflective surfaces, including playing	<u>Context of Study</u> This is the first of two units in which light is studied as part of the discipline of physics- the study of the processes that shape our world and how we use it. Pupils will have a secure knowledge of the terms opaque, transparent and translucent from Key Stage 1, they will also know what plants need, including light, to grow and how energy from light is the start of a food chain. In this unit pupils learn we need light in order to see and that dark is the absence of light. This unit provides the opportunity for pupils to builds upon their prior knowledge of materials as they recognise that shadows are formed when an opaque object blocks the light from a light source. Pupils will find patterns in the way that the size of shadows changes as well as how light is reflected from surfaces and can be separated into a prism of colours. Pupils learn that light from the sun can be dangerous and that there are ways to protect their eyes. This is the precursor to work studied in Year 6 where pupils learn in more detail how shadows are formed. The knowledge acquired in this unit will help pupils to understand how light travels in straight lines and how the amount of light entering the eye is controlled by the pupil. <u>Knowledge Content</u> Know that light is part of the discipline of **physics.** Know that physics is the study of the processes that shape our world and how we use it. <u>Children already know:</u> - that shadows are dark and are similar in shape to the object forming them. <u>Light</u> Know that we need light to see. Know that light is a form of energy. Know that energy is needed to make things happen. Know that every movement or change, no matter how small, requires energy. Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another. Know that light travels in straight lines. Know that the Sun, fire, electric light and torches are all sources of light.

mirror games to help them to answer questions about how light behaves. Think about why it is important to protect their eyes from bright lights. Look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change. Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses. Look for patterns in what happens to shadows when the light source moves or the distance between the	Know that the Sun gives off light and heat Know that the Moon is not a source of light because it reflects sunlight. Know that darkness is the absence of light, but few children experience 'darkness' because of street lighting, night lights, etc. Know that looking directly at the sun is dangerous, as the light is too strong. Know that filaments in traditional bulbs heat up until they glow, giving off light and heat. Know that fluorescent bulbs glow when electricity adds energy to a gas within the bulb. Understand that Ultraviolet (UV) light causes blindness or other long term vision problems and that eyes should be protected by covering with either a wide brimmed hat / cap and sunglasses. <u>Reflections</u> Know that light is reflected from surfaces (smooth, shiny surfaces reflect light more efficiently). Know that reflection of light is when we can see the light on another surface. Know that light reflects off objects and enters our eyes. This is how we see. Know that dull materials scatter light and do not reflect very well. Know that shiny objects, such as mirrors, reflect light extremely well. Know that the bouncing of light off objects is known as reflection. Know that objects that have a rough surface do not reflect light well; they scatter it and we cannot see ourselves in them. Know that objects that are very smooth and shiny reflect light well and we can see images, reflections. Know that most mirrors are made from a smooth piece of glass with a silvery coating at the back of it. Know that a reflection is the wrong way around. Know why the word ambulance is reversed.

light source and the object change.	 Know that a rainbow occurs when it is sunny and raining. Know that light can be separated with a prism into different colours.  Know that in a rainbow, drops of rain act like a prism to create a rainbow.

	Know that sometimes double rainbows can occur. Know that Rainbows occur when the sun is low in the sky. Know that white light consists of many different colours. These are - Red, Orange, Yellow, Green, Blue, Indigo, Violet. This is known as the spectrum of colours. Know that this can be recalled with the mnemonic 'Richard of York Gave Battle In Vain' or ROY G BIV.  <u>Shadows</u> Know that shadows are formed when the light from a light source is blocked by a solid object. Know that objects that do not let light through them are called opaque: these objects make dark shadows. Know that objects that let a little light through, such as bathroom windows, are called translucent objects. Know that objects that let all or nearly all light through, such as water or clear plastic film, are called transparent. Know that the distance of the light source away from an opaque object changes the length of the shadow. Know that the further away the light source the smaller the shadow as less light is blocked. Know that the nearer the light source the larger the shadow as more light is blocked.

Vocabulary	Definition
dull	a surface that scatters light and does not look shiny
light source	the place where light originates from
mirror	a shiny polished surface
observation	what we see happening in a scientific test
opaque	not letting light pass through
reflect	to change the direction of light using a shiny surface
shadow	darkness caused by light being blocked
shiny	surfaces that reflect lots of light
translucent	letting some light through
transparent	letting most or all light through

<u>WORKING SCIENTIFICALLY</u>

Give children a range of materials that are transparent, translucent and opaque, remind them that these are words that they learned in Key Stage 1. Ask them to hold each material up to the light shining from a window. Encourage them to sort the materials into those that let no light through (opaque), some light through (translucent) and all of the light through (transparent). Ask them to record their findings in a table. This could be done by cutting swatches of the materials and gluing them onto their table. Challenge them to make predictions about each of the fabrics and write them in another column on their table.

<u>STEAM Opportunities</u>

- Use standard measures for the length of shadows, collect data in a table and transfer data from table to bar graph.
- Use tablets or digital cameras to shoot photos and video.
- Video puppet shows.
- Use a range of materials to make a shadow puppet and evaluate the end product.

	- Visit a local lighting shop to see the different varieties of lights and light bulbs. - Visit a local museum where they show lighting throughout the ages.
	<u>Outcome</u> Topic Test 4 How do pupils get bigger and smaller
	<u>Reading Link</u> Firework Maker's Daughter
	<u>Scientist/Inventor</u> Li Tan
Approved Resources	BBC Bitesize Switched on Science CGP

<table>
<tr><th>Year 4 Term Spring 2</th><th>Unit Title: Sound</th></tr>
<tr><th>NC Objectives</th><th>Key Knowledge Content</th></tr>
<tr><td rowspan="2">Identify how sounds are made, associating some of them with something vibrating.

Recognise that vibrations from sounds travel through a medium to the ear.

Find patterns between the pitch of a sound and features of the object that produced it.

Find patterns between the volume of a sound and the strength of the vibrations that produced it.

Recognise that sounds get fainter as the distance from the sound source increases.

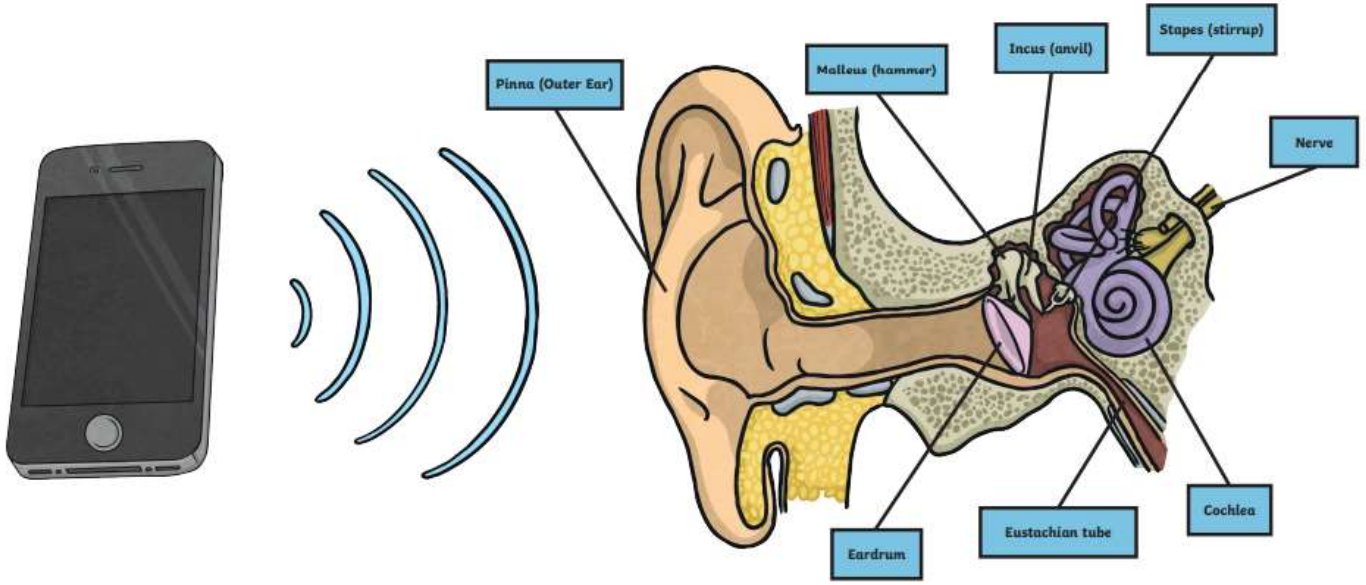
Non-statutory notes
Explore and identify the way sound is made</td><td><u>Context of Study</u>
This is the only unit in which sound is studied as part of the discipline of physics- the study of the processes that shape our world and how we use it. Pupils may already know many things about sound; however, we assume that pupils have little prior knowledge of the unit. Therefore, in this unit we will explicitly teach the meaning of subject specific vocabulary. In Year 4, pupils identify how sounds are made, recognise that vibrations from sounds travel through a medium to the ear and how they can be changed in volume, pitch and over distance. The knowledge of sound acquired in this unit will help pupils find patterns between the pitch of a sound and features of the object that produced it. It also helps pupils find patterns between the volume of a sound and the strength of the vibrations that produced it. Pupils will know that sounds get fainter as the distance from the sound source increases.</td></tr>
<tr><td><u>Knowledge Content</u>
Know that sound is part of the discipline of physics.
Know that physics is the study of the processes that shape our world and how we use it.

<u>Children already know:</u>
- That we hear with our ears.
- How to make loud noises.

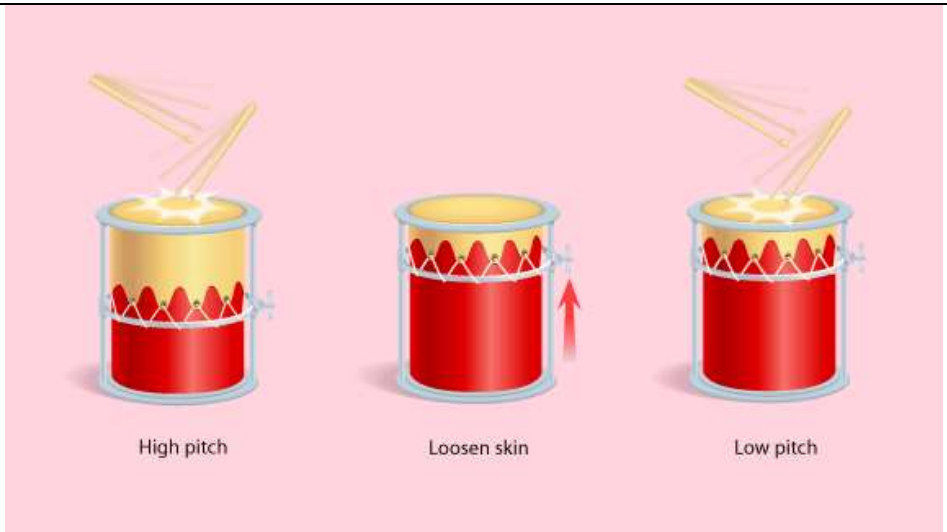
<u>Children’s misconceptions:</u>
- That ‘noise’ and ‘sound’ are the same.
- That ‘volume’ means how much liquid is there. It has two meanings, and this needs to be clarified with the children.
- That ‘pitch’ is related to a football playing field, or even a road covering.
- That ‘volume’ and ‘pitch’ are the same thing.

<u>Sound and Vibrations</u>
Know that sound is produced by vibrations, even when it is hard to see them.</td></tr>
</table>

through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways. Find patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.	Know that vibrate means to shake with repeated small quick movements. Know that the vibrations travel through the air and are detected by our ears. Know that within the ear is an ear drum which vibrates and turns the vibrations into signals to the brain, which then 'hears' the sounds. Know that sound travels faster through liquids than air, and even faster through solids. Know that no-one can hear anything in space. Know that noise can be defined as unwanted sound. Know that sound waves can travel through solids (such as metal, stone and wood), liquids (such as water) and gases (such as air). Know that metal vibrates when it is struck. Know that vocal **cords** inside our throat vibrate when we speak. Know that this causes the air around the source of the sound to vibrate. The vibration travels through the air to our ear in a wave. <u>Whale Song</u> Know that whales can communicate over many miles underwater. Know that they communicate through a combination of clicks, whistles and pulsing sounds. Know that this is often called **Whale Song.** Know that sound travels four times faster underwater than through air. Know that some whale song can be heard over 100 miles away from the source. Know that ambient noise created by humans such as boats, machines in the water can cause difficulties for whales trying to communicate. Listen to <u>https://www.youtube.com/watch?v=WabT1L-nN-E</u> Read the Whales' Song by Dyan Sheldon. Further information - <u>http://www.whalefacts.org/how-do-whales-communicate/</u> <u>Anatomy of the ear</u> Know the structure/ anatomy of the human ear. Know that the ear consists of the outer ear and inner ear.

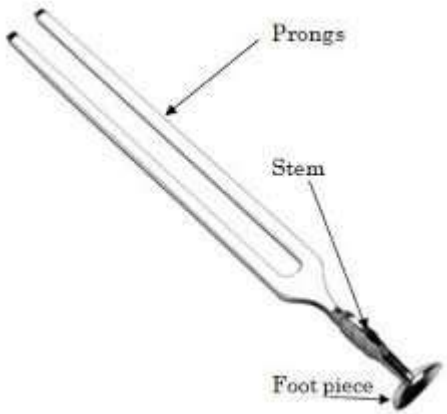
	Know that the **eardrum** is a thin piece of stretched skin inside the ear which vibrates. Know that these vibrations then travel through a sequence of small bones (the smallest bones in the human body). Know that these bones connect to the **cochlea.** Know that the cochlea looks like a snail shell (the word 'cochlea' means snail in Ancient Greek). Know that small hairs in the cochlea convert the vibrations into nerve impulses which send information to the brain for processing.  <u>Pitch</u> Know that pitch is how high or low a sound is. Know that a high-pitched sound has a high **frequency.** Know that a low-pitched sound has a low frequency. Know that the following words would be used to describe low and high pitch sounds Low Pitch: squeak, squeal High Pitch: rumble, grunt, boom

	Know that pitch and volume are different - volume is how loud or quiet a sound is. Know that there are high pitches and low pitches. Know that a short string gives a higher-pitched sound than a long string when they are plucked. Know that a tight drum skin gives a higher-pitched sound than a loose drum skin.  **Whistle** **High pitch sound**  **Drum** **Low pitch sound**



<u>Volume</u>

Know that the volume of a sound is how loud or quiet a sound is.
Know that the stronger the vibrations the louder the sound.
Know that the weaker the vibrations the quieter the sound.
Know that as sounds travel the vibrations become weaker, because they run out of energy.
Know that the volume of the sound will decrease the further away a sound is from an ear to hear it.
Know that a vibrating tuning fork cannot be heard until the stem is placed on a table. This causes the table to vibrate very slightly.



Know that too much sound can damage our ears. So, we can wear ear defenders, for example when using an electric drill, tree-cutting, driving a tractor, airside workers at an airport, disc jockeys and workers in noisy factories.

Vocabulary	**Definition**
Pitch	How high or low a note is
Sound Source	Something that makes a sound
Vibration	When something moves up or down, backwards and forwards or from side to side quickly
Volume	How loud a sound is
Cords	Produce the voice
Eardrum	A thin piece of stretched skin inside the ear which vibrates
Cochlea	Part of the inner ear, meaning snail shell
Tuning fork	A two-pronged steel device used by musicians, which vibrates when struck to give a musical note
Frequency	How often something happens

	WORKING SCIENTIFICALLY Children carry out a fair test and use their results to answer the question. Can sounds travel through a medium (material) to the ear? Make earmuffs from a variety of different materials to investigate which provides the best insulation against sound, record results in a table.
	STEAM Opportunities - Invite in to class a musician to talk about their instrument and music and to create music with the class. - Visit a theatre or concert hall to learn about the acoustics and play their own instruments. - Design, make, use and evaluate a musical instrument. - Look at cartoon sound images, e.g., bam, kapow, boom, wham, bang, whizz.
	Outcome Topic Test 4 Does how you pluck a Ukulele string change the volume?
	Reading Link Horrid Henry Rocks
	Scientist/Inventor Alexander Graham Bell
Approved Resources	BBC Bitesize Switched on Science CGP

<table>
<tr><th>Year 5 Term Spring 2</th><th>Unit Title: Earth and Space</th></tr>
<tr><th>NC Objectives</th><th>Key Knowledge Content</th></tr>
<tr><td rowspan="2">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 notes
Introduce a model of the sun and Earth that enables them to explain day and night.

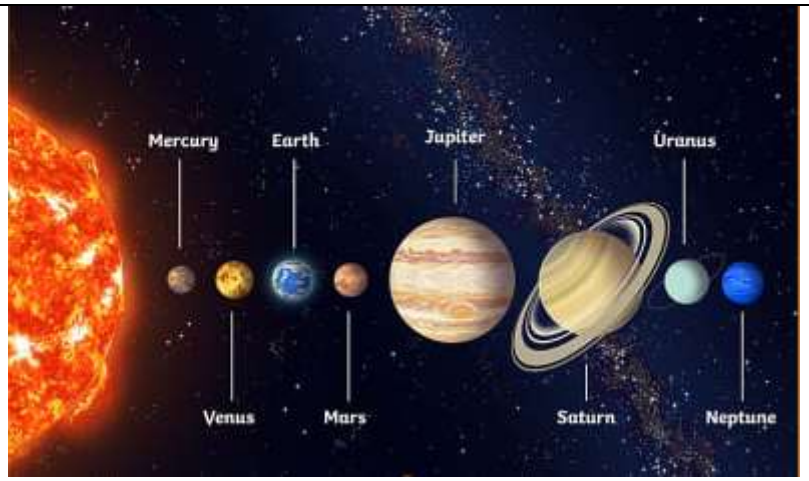
Learn that the sun is a star at the centre of our solar</td><td><u>Context of Study</u>
This unit is the last of three science units where pupils study forces as part of the discipline of physics - the study of the processes that shape our world and how we use it. There are also many links to the discipline of chemistry - the study of substances that make up matter. Pupils have a secure knowledge of the effects of air resistance, water resistance and friction, that act between moving surfaces. Pupils know that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. Previous learning includes how some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. Pupils know about magnetic and non- magnetic materials, and thermal and electrical conductivity. They know some forces need contact between two objects, but magnetic forces can act at a distance. Pupils know magnets have two poles and that they attract or repel each other.

In this Year 6 unit, pupils learn about space. Starting with the Solar System, they look next at how ideas about space have changed over time before they explore what causes us to experience night and day on Earth. Pupils will describe the Sun, Earth and Moon as approximately spherical bodies as well as learn about the movement of the Moon relative to the Earth. By the end of the unit, pupils use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. This unit is the precursor to work studied in KS3 when pupils continue to study forces as part of the discipline of physics.</td></tr>
<tr><td><u>Knowledge Content</u>
Know that Earth and Space is part of the discipline of physics.
Know that physics is the study of the processes that shape our world and how we use it.

<u>Children already know:</u>
- That Earth and space are not covered in Key Stage 1 or lower Key Stage 2 at all. However, the children will be aware of our Sun and may be familiar with the names of some of the planets.
- The study of light and shadows in Year 3 introduces children to the Sun's apparent movement across the sky.</td></tr>
</table>

system and that it has 8 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). Understand that a moon is a celestial body that orbits a planet (Earth has 1 moon; Jupiter has 4 large moons and numerous smaller ones). Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses. 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	<u>Children's misconceptions:</u> - That there is only one Solar System – there are lots. - That the Earth is at the centre of our Solar System. - That there are stars in our Solar System other than the Sun. - That all planets have rocky surfaces. Some do, but the outer planets are gas giants. - That planets can only be seen with a telescope. In fact, you can see Mercury, Venus, Mars, Jupiter and Saturn without a telescope. - The Sun moves around the Earth and causes day and night (the spinning Earth causes it). - That night-time is caused because the Sun goes to the back of the Earth. In fact, it is the Earth that moves. <u>Sun, Moon and Earth</u> Know that our Solar System has a large star, the Sun, at its centre and eight planets and their moons, which orbit the Sun. Know that the sun is a star and the moon is a satellite, not planets. Know that in medieval times and before, it was commonly accepted that Earth was flat. Know that nowadays, we have photographic and other evidence to show that, like other planets and the Moon, Earth is spherical in shape. Know that the Earth and the Moon both move. Know that when you look up into the sky and the Sun seems to move around the Earth, this is an illusion: in fact the Earth spins and causes night and day. Know that the part of the Earth that faces the Sun is in daylight and the part that is not facing the Sun is in darkness. Know that before modern calendars, people used to keep track of the days by watching the phases of the Moon. Know that one full cycle of the Moon's phases is approximately 28 days, which is very close to the amount of time we now know as one month. Know that the Earth rotates once every 24 hours. Know that this creates day and night as the Earth takes 24 hours to complete one spin on its axis. Know that the Earth orbits around the sun once every 365 and a quarter days (one year).

scientists such as Ptolemy, Alhazen and Copernicus. 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	Know that every 4 years the Earth year is 366 days long due to the 4 quarter days equalling an extra day. We refer to this as a leap year. Know that the extra day occurs on Feb 29th. Know that the sun is the ball of gas in the sky that the Earth goes round, and that gives us heat and light. Know that it is not safe to look directly at the Sun, even when wearing dark glasses. Know that the orbit is the curved path in space that is followed by an object going round and round a planet, moon, or star Know that the Earth spins on an imagined axis, tilted at approximately 23° Explain how this also alters how we see the sun in different positions in the sky throughout the day, and this makes the sun look as if it is moving when it is in fact Earth. Know that the sun appears to rise in the east and sets in the west. <u>Solar System</u> Know that the planets in order of their distance away from the Sun are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. Know that this can be remembered with a pneumonic: **My Very Easy Method Just Speeds Up Naming Planets** **Know the approximate relative size of planets from this diagram**

been used as astronomical clocks.	 Know that the planet names are derived from Roman and Greek mythology, except for Earth which is Germanic and Old English in origin. Know that the four smaller inner planets, Mercury, Venus, Earth and Mars, are mainly composed of rock. Know that the four outer planets, Jupiter, Saturn, Uranus and Neptune are called the 'gas giants'. Know that Pluto is now classed as a dwarf planet. Know that planets have their own moons. Know that only Earth is habitable. Know that the model of the Solar System has been refined over many centuries by many scientists: <u>Aristotle (384 BC–322 BC)</u> Know that Aristotle proposed the **geocentric** model, with Earth at the centre of the Universe. The five known planets (Mercury, Venus, Mars, Jupiter and Saturn), the Moon, the Sun and the stars moved around Earth in perfect spheres. <u>Ptolemy (c. 90–168 AD)</u> Know that Ptolemy refined the geocentric theory. Ptolemy said they did not travel in exact spheres but moved around the spheres on oval/elliptic orbits, turning around on themselves. <u>Alhazen (965–1038 AD)</u>

	Know that Alhazen first used maths to describe the motions of the planets. <u>Nicolaus Copernicus (1473–1543)</u> Know that Copernicus made accurate observations of the Moon and the planets. He used maths to show that their movements could be explained much better if he put the Sun at the centre of the Solar System. <u>Johannes Kepler (1571–1630)</u> Know that Kepler used maths to show that the orbit of a planet is an ellipse with the Sun at its focus and that it moves faster when it is closer to the Sun than when further away. <u>Galileo Galilei (1564–1642)</u> Know that Galilei championed the **heliocentric** model and used telescopes to show that Jupiter had moons. <u>Space Exploration</u> Know that the first animal in space was a dog named Laika Know that the first man in space was Yuri Gagarin on VOSTOCK 1 in 1961 Know that the first moon landing was Apollo 11 in 1969 Know that Alan Shepherd was the first American in space in 1961 Know that Valentina Tereshkova was the first woman in space in 1963 Know that there was a 'space race' to be the first country to put a person on the moon between Russia and USA Know that Richard Nixon was president of the USA at this time. Know that Neil Armstrong was the first person on the moon in 1969 Know that Edwin 'Buzz' Aldrin was the second person on the moon after Neil Armstrong in 1969. Know that this moon landing was a key cultural event watched by approximately 600 million people. Know that Tim Peake was the most recent Briton to go into space in 2015 Know the following quote "The eagle has landed" which was said when the Apollo 11 ship first touched down on the moon Know the following quote "That's one small step for man, one giant leap for mankind" which was said when Neil Armstrong first stepped off the ladder of the lunar lander onto the moon. Know that Edwin 'Buzz' Aldrin and Neil Armstrong spent about 20 hours on the moon's surface collecting rock samples to find out more about the moon. Know that NASA stands for National Aeronautics and Space Administration and they are the government operated agency that carries out scientific investigation into space.

Time Zones

Know that there are different time zones across the world because of the rotation of the Earth.
Know that as you move eastwards from the UK you add time on.
Know that as you move westwards you subtract time.
Know that to find the time in Sydney, Australia you add 9 hours on (this changes when the clocks change in October).

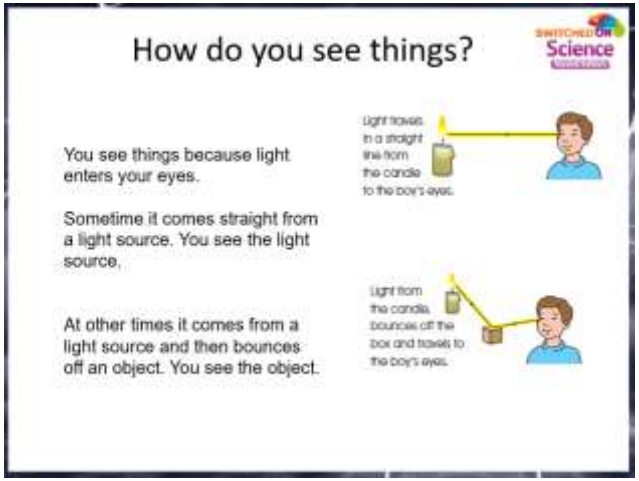
Know the vocabulary and definitions in the table:

Vocabulary	**Definition**
Daytime	The time when part of the Earth is in daylight
Heliocentric	(Sun-centred) the Sun is at the centre of the Solar System. The belief that the Sun is at the centre of the Solar System is heliocentrism
Night-time	The time when part of the Earth is in darkness
Orbit	The path of a planet or moon around another celestial object
Planet	A celestial body that orbits a star, is round and has cleared smaller objects away from its orbit
Solar System	A series of planets that orbit a star
Star	An astronomical body that produces its own energy
Sun	The star at the centre of our Solar System
Time Zone	A geographical region where the same time is set
Geocentric	(Earth-centred) the Earth is at the centre of the Solar System
Rotation	To turn or spin
Galaxy	A collection of star systems
Nebula	A cloud of gas and dust in space
Universe	Everything that exists anywhere
Spherical	Shaped like a sphere

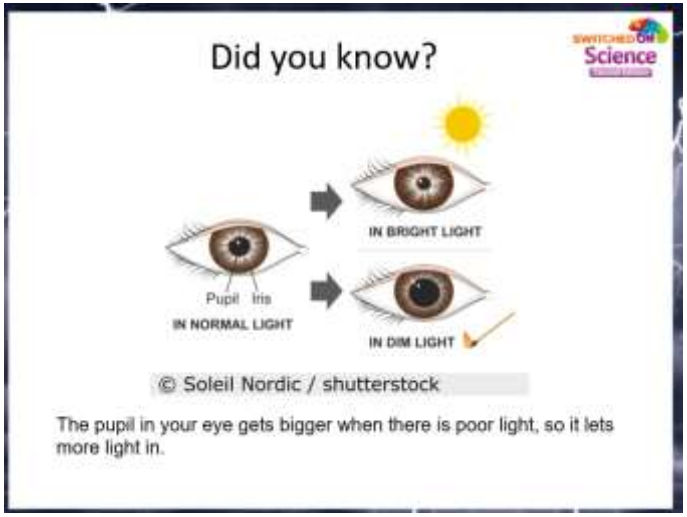
<table>
<tr><td></td><td>
<table>
<tr><td>ISS</td><td>The International Space Station</td></tr>
<tr><td>Celestial Body</td><td>An object in space</td></tr>
<tr><td>Atmosphere</td><td>The gases surrounding a planet</td></tr>
<tr><td>Meteor</td><td>A small rock that hits the earth’s atmosphere</td></tr>
<tr><td>Satellite</td><td>Any celestial body orbiting around a planet or star</td></tr>
</table>

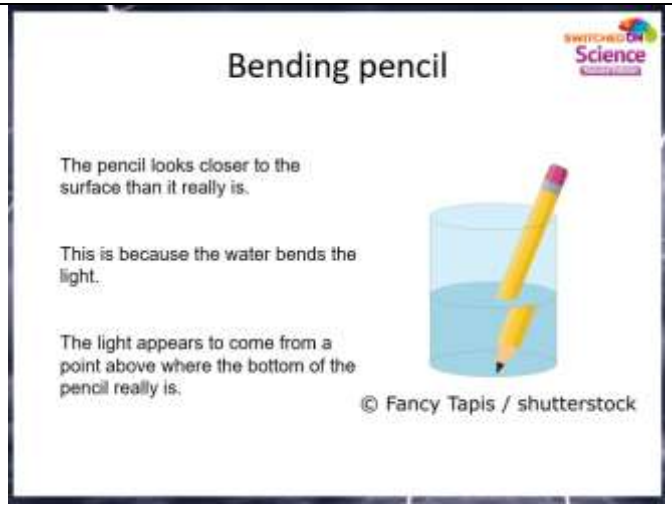
<u>WORKING SCIENTIFICALLY</u>
Children research two planets to develop the ability to compare and contrast the similarities and differences between planets and understand their nature in the Solar System.
Make sure that across the class all the planets in the Solar System are researched. Make sure that the Earth, Sun and Moon are also researched.
</td></tr>
<tr><td></td><td><u>STEAM Opportunities</u>
- Arrange for an inflatable planetarium to visit the school.
- Visit the science museum in Manchester
- Use search engines to find out information about the Solar System and present it.
- Make papier-mâché planets.</td></tr>
<tr><td></td><td><u>Outcome</u>
Topic Test 4
Show how the planets move in our Solar System</td></tr>
<tr><td></td><td><u>Reading Link</u>
George’s secret key to the universe</td></tr>
<tr><td></td><td><u>Scientist/Inventor</u>
Margaret Hamilton</td></tr>
<tr><td>Approved Resources</td><td>BBC Bitesize
Switched on Science
CGP</td></tr>
</table>

Year 6 Term Spring 2	Unit Title: Light
NC Objectives	**Key Knowledge Content**
Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. **Non-statutory notes** Build on the work on light in year 3, exploring the way that light behaves,	<u>Context of Study</u> This is the second of two units in which light is studied as part of the discipline of physics- the study of the processes that shape our world and how we use it. Pupils will have a secure knowledge of the terms opaque, transparent and translucent from Key Stage 1. From Year 3 pupils know that we need light in order to see and that dark is the absence of light. Pupils will also have an understanding of how light is reflected from surfaces, can be separated in to a prism of colours and that shadows are formed when an opaque object blocks the light from a light source. In Year 6 pupils are reminded that light from the sun can be dangerous and that there are ways to protect their eyes. In this unit pupils learn in more detail how shadows are formed. The knowledge acquired in this unit will help pupils to understand how light travels in straight lines and how the amount of light entering the eye is controlled by the pupil. Pupils will look at beams of light and how light travels to enable them to understand how we see things. This understanding is then applied to the production of shadows and starts to look at how light is reflected. The unit then takes the learning into the realm of coloured light and rainbows, using scientific skills to raise and answer questions. <u>Knowledge Content</u> Know that light is part of the discipline of **physics.** Know that physics is the study of the processes that shape our world and how we use it. <u>Children already know:</u> - The terms opaque, transparent and translucent. - We need light to see and that darkness is the absence of light. - We see with our eyes - How to make a shadow - That light can be reflected from some surfaces <u>Light</u> Know that light travels in straight lines from its source. Know that some light sources are natural (stars, sun, fire, lightning, bioluminescence). Know that some light sources are man-made (torch, light bulb, digital screen, laser pointer).

including light sources, reflection and shadows. Talk about what happens and make predictions. Decide where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. Investigate the relationship between light sources, objects and shadows by using shadow puppets. Look at a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water, and coloured filters.	Know that when light passes from one material into another, it changes direction. Know that the change in direction is known as refraction. Know that light travels faster than sound, (330m/s), which is why we see lightning before we hear thunder and why, when we look at someone hitting something from a distance, we see them make the action before we hear the sound. Know that the scientists Plato and Ptolemy developed theories which stated that we see things because the eyes emit rays. <u>Reflection</u> Know that light either travels in a straight line directly from the source or by reflecting off a surface into our eye. Know how to draw arrows to show light entering the eye from a light source or reflection. Know that reflection is when light bounces off a surface, changing the direction of a ray of light. Know that all objects reflect light Know that smooth and shiny surfaces reflect all the rays of light at the same angle, rather than scattering the rays of light like rough or dull surfaces. Know that when rays of light reflect, they obey the law of reflection 'The angle of incidence always equals the angle of reflection.' 

	<u>Shadows</u> Know that a shadow is formed when light is blocked by an opaque object. Know that opaque means light cannot pass through. Know that translucent means some light can pass through but it is difficult to see through. Know that transparent means light can pass easily through and it is easy to see through. Know that as light travels in straight lines shadows have the same shape as the objects that cast them. Know that if something casts a light or shadow somewhere, it causes it to appear there. Know that the further the light source from the opaque object the bigger the shadow. Know that the nearer the light source from the opaque object the smaller the shadow. Know that the shadow of an object can be moved by moving the light source. Know that a silhouette is different from a shadow because a silhouette is the solid dark shape that you see when someone or something has a bright light or pale background behind them.  <u>The Eye</u> Know that the amount of light entering the eye is controlled by the pupil. Know that the pupil is surrounded by the iris.

	Know that the iris is the coloured part of the eye. Know that the pupil dilates when it is darker to let more light into the eye. Know that the pupil constricts when it is bright to reduce the amount light entering the eye.  <u>Bending Light</u> Know that light cannot travel as quickly in water as it does in the air. Know that light bends around the pencil, causing it to look bent in the water. Know that it makes the pencil look bigger and makes the angle appear bigger than it actually is, causing the pencil to appear crooked.



Vocabulary	**Definition**
Cornea	The outer clear covering over the eye
Iris	The coloured part of the eye
Lens	The part of the eye that focuses the light
Light ray	The path light takes
Pupil	The black hole in the centre of the coloured part (iris) that lets light into the eye
Rainbow	Occurs when sunlight hits rain, splitting the light into its colours
Reflection	Light bouncing off the surface of an object
Symmetry	When one shape becomes exactly like another if you flip, slide or turn it. The simplest type of symmetry is ‘reflection’ (or ‘mirror’) symmetry

	WORKING SCIENTIFICALLY Use sticks and mirrors to create simple periscopes that allow people to see what is happening behind or above them. Create labelled diagrams that show the path that the light took to reach the eye.
	STEAM Opportunities - Create silhouettes (Hans Christian Anderson) - Visit a planetarium to find out about how telescopes work. - Watch a shadow puppet play - Measuring/reflective symmetry
	Outcome Topic Test 4 Pinhole Camera
	Reading Link Letters from the Lighthouse
	Scientist/Inventor Christian Doppler
Approved Resources	BBC Bitesize Switched on Science CGP