# The Cathedral School Of St Peter and St John R.C Primary Sound

## Year Four - Sound

**National Curriculum Objectives:**

- Know how sound is made associating some of them with vibrating.
- Know what happens to a sound as it travels from its source to our ears.
- Know the correlation between the volume of a sound and the strength of the vibrations that produced it.
- Know how sound travels from a source to our ears.
- Know the correlation between pitch and the object producing a sound.

*Non statutory: Pupils should explore and identify the way sound is made 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. Pupils might work scientifically by: finding 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.*

**Inspiring science key ideas:**

Vibrations

- **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 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.**
- Sounds can be made in a variety of ways (pluck, bang, shake, blow) using a variety of things (instruments, everyday materials, body).
- Sounds travel away from their source in all directions.
- Vibrations may not always be visible to the naked eye.

Pitch

- **Find patterns between the pitch of a sound and features of the object that produced it.**
- Sounds can be high or low pitched.
- The pitch of a sound can be altered.
- Pitch can be altered by changing the material, tension, thickness or length of vibrating objects or changing the length of a vibrating air column.

Muffling/blocking sounds

- **Recognise that vibrations from sounds travel through a medium to the ear.**
- Sounds are heard when they enter our ears (although the structure of the ear is not important key learning at this age phase).
- Sounds can travel through solids, liquids and air/gas by making the materials vibrate.
- Sound travel can be reduced by changing the material that the vibrations travel through.
- Sound travel can be blocked.

**Working scientifically**

- *Finding 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 ear muffs 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.*

*Additional suggestion from Lancashire for working scientifically opportunities which enhance learning and support using ICT across the curriculum*

- This unit provides an ideal opportunity for using data logging equipment to detect/measure and compare sounds.

| Prior learning | **Key Learning – What the pupils need to know** | **Vocabulary** |
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**The Cathedral School Of St Peter and St John R.C Primary** **Sound**

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| In KS1:<br>• May have some understanding that objects make different sounds.<br>• Some understanding that they use their ears to hear sounds.<br>• Know about their different senses. | 1: Describing sounds<br>•Sounds can be made in many different ways and individual sounds have the properties of pitch and volume.<br>•When a sound is made it immediately spreads out in all directions. As it travels its volume decreases but its pitch remains the same.<br><br>2: How sounds are made and travel.<br>• Sound is made when an object is made to vibrate (move backwards and forwards or up and down).<br>• As the material vibrates it makes whatever it is in contact with vibrate, including air. As the air vibrates it makes whatever it is in contact with vibrate also, which might be a wall or even your eardrum. Sound moves through materials vibrating making other materials they are in contact with vibrate.<br><br>Why does pitch and volume change?<br>• Pitch and volume are determined by how the material vibrates:<br>¬ Pitch is determined by how fast an object vibrates, i.e. the frequency of vibration. The higher the frequency the higher the pitch. ¬ Volume is determined by how big the movement of each vibration is (the amplitude of vibration). The bigger the amplitude the higher the volume.<br>• Smaller objects and tighter strings and surfaces tend to vibrate with a higher frequency | Pitch, loudness, vibrate, vibration, muffle, tuning, quiet, soft, noise, sound, loudness, loud, volume, tension, tight, air, air column, muffle |
| In KS3<br>• frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound<br>• sound needs a medium to travel, the speed of sound in air, in water, in solids<br>• sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal<br>• auditory range of humans and animals. | | |

**The Cathedral School Of St Peter and St John R.C Primary** **Sound**

## Year Five – Earth and space

**National Curriculum Objectives:**

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

*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).*
***Note:** 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.*

**Inspiring science key ideas:**

- 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.
- The Earth spins once around its own axis in 24 hours, giving day and night.
- The Earth orbits the Sun in one year.
- We can see the Moon because the Sun's light reflects off it.
- The Moon orbits the Earth in approximately 28 days and changes to the appearance of the moon are evidence of this.
- The Sun *appears* to move across the sky from East to West and this causes shadows to change during the day.
- Changes to shadow length over a day or changes to sunrise and sunset times over a year are evidence supporting the movement of the Earth.
- (See **UKS2 'Forces'** for Key Learning on gravity).

**Working scientifically**

- *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. [research]*

| Prior learning (See **'Forces'** for Key Learning on gravity linked to this unit). | **Key Learning – What the pupils need to know** | **Vocabulary** |
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| In Year 3:<br>• Recognise that they need light in order to see things and that dark is the absence of light.<br>•Notice that light is reflected from surfaces.<br>• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.<br>• Recognise that shadows are formed when the light from a light source is blocked by a solid object.<br>• Find patterns in the way that the sizes of shadows change. | • What do we know about the Earth, Sun and Moon?<br>• How do the Earth, Sun and Moon fit within our solar system?<br>• How do we get day and night?<br>• What do we know about the shape and movement of the Earth?<br>• Why does the moon appear to change shape?<br>• How do shadows, created by the sun, change during a day?<br>• How were shadows used in the past to help people tell the time?<br><br>• The universe is vast and contains billions of stars.<br>• The solar system is a collection of planets and moons orbiting our nearest star, the sun. It can be represented using a model.<br>All objects in the solar system are spinning as well as orbiting.<br>• The time it takes for an object to spin once is called a day<br>• The time it takes a planet to orbit the un is called a year<br>Stars produce vast amounts of heat and light. All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars | Sphere/spherical, revolve, orbit, spin, rotate, axis, sunrise, sunset, north, south, east, west, rotate around, rotate on its axis<br><br>Solar system, Sun, Moon, star, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, planet<br><br>Sundial, shadow clock<br><br>Model, compare, evidence<br><br>Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, crescent, gibbous. Mercury, Venus, Mars, Jupiter, Saturn, Uranus, |

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| | How would a solar eclipse be different if: a) The moon was a different size? b) The earth span faster or slower? c) The sun was large or smaller. d) If the earth and moon were the same size but further away in the solar system. | Neptune, planets, solar system, day, night, rotate, orbit, axis, spherical, geocentric, heliocentric. |

In Year 6
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.
- Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.

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## Year Six – Light and how it travels

**National Curriculum Objectives:**

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.
- Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.

*Non statuory: Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions. Pupils might work scientifically by: deciding 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. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).*

**Inspiring science key ideas:**

- 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 the light that 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.

**Working scientifically**

- *Deciding [observe/explore] 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.*
- *Investigating the relationship between light sources, objects and shadows by using shadow puppets extend their experience of [explore and observe] light by looking at a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).*

| Prior learning | Key Learning – What the pupils need to know | Vocabulary |
|---|---|---|
| How does light behave? | • How does light travel?<br>• How do we see?<br>• How does light get into our eyes?<br>• How can we use mirrors to see behind us?<br>• How do shadows created by the sun change during a day?<br>• How can we represent light travelling in drawings?<br>• Can you make simple drawings to help to explain how light travels? | |

**The Cathedral School Of St Peter and St John R.C Primary** **Sound**

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| In Year 3:<br>• Recognise that they need light in order to see things and that dark is the absence of light.<br>•Notice that light is reflected from surfaces.<br>• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.<br>• Recognise that shadows are formed when the light from a light source is blocked by a solid object.<br>• Find patterns in the way that the sizes of shadows change. | When light is emitted from a light source it travels in straight lines until it hits an object. This can be represented by an arrow.<br>•Shadows form when light hits an opaque object, the area behind is in darkness because light can only travel in straight lines<br><br>When light hits a transparent object it goes through it in a straight line so we can see a clear image through it. When light hits a translucent material it goes through it but is scattered, this means light can pass through but we can't see an image through it.<br>• When light hits a mirrored surface it reflects off it in straight lines, so we can see an image in the reflective material Some times when light hits a material it reflects off it in many different directions (it is scattered). In this case light will be reflected but no image will be seen in the material Shiny surfaces are better reflectors and rough surfaces scatter light more. Opaque objects don't allow any light to pass through them.<br><br>Animals see objects when light is reflected off the object and enters the eye through the pupil. The pupil changes its size to allow enough, but not too much light into the eye. Too much light damages the eye and too little results in poor quality images. | see, seen, light source, eyes, travel<br><br>shadow, opaque, block<br><br>reflect, reflection, mirror, direction<br><br>light travelling, light beam, straight lines,<br><br>cast, periscope, rear-view mirror, object, shadow puppet, rainbow, colours, bend, split |
| In KS3:<br>• the similarities and differences between light waves and waves in matter<br>• light waves travelling through a vacuum; speed of light<br>• the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface Science<br>use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye<br>• light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras<br>• colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. | | |