



## Medium Term Planning - Topic: Light and Sound

<p><b>Curriculum Intent</b></p> <p><b>Skills/National Curriculum Links</b></p>	<p>In addition to working further on objectives from Year __, pupils will be taught, following National Curriculum guidelines, the following this topic:</p> <ul style="list-style-type: none"> <li>- the similarities and differences between light waves and waves in matter <ul style="list-style-type: none"> <li>- light waves travelling through a vacuum; speed of light</li> </ul> </li> <li>- the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface</li> <li>- 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 <ul style="list-style-type: none"> <li>- light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras</li> </ul> </li> <li>- colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection</li> <li>- frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound</li> <li>- sound needs a medium to travel, the speed of sound in air, in water, in solids</li> <li>- sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal <ul style="list-style-type: none"> <li>- auditory range of humans and animals</li> </ul> </li> </ul>
<p><b>Spiritual, moral, social, and cultural development</b></p>	<p><b>SMSC:</b> The importance of light and sound in real life. Students will reflect on their experiences and apply their understanding to a range of issues. Students will be encouraged to be reflective about their own beliefs and those of others and compare different people's faiths, feelings and values in order to develop their own perspective on life. Students will explore how Science influences the next stage of their education and/or employment.</p> <p><b>PSHE/British Values:</b> learn about everyday use of light and sound, learn about auditory ranges of animals and humans</p> <p><b>Skills Builder:</b> Listening (Receiving, retaining and processing info), Speaking (The oral transmission of info and ideas), Problem solving (Find a solution to a situation or challenge), Creativity (imagination and generation of new ideas), Staying positive (The ability to use tactics and strategies to overcome setbacks), aiming high (Set clear and tangible goals), Leadership and teamwork</p>
<p><b>Numeracy</b></p>	<p><b>Use of equations, calculations, graph skills, interpreting graphs,</b></p>
<p><b>Literacy</b></p>	<p><b>Vocabulary Tier 2:</b> transferring, difference, boundary, trace, observation, compare, contrast, reasoned, interacts, materials, shadow,</p> <p><b>Vocabulary Tier 3:</b> waves, matter, longitudinal, transvers, sound, m/s, transmitted, supersonic, vibrations, vacuum, amplitude, frequency, wavelength, loudness, oscilloscope, auditory range, pitch, period, light, solar eclipse, ray diagram, mirror, specular, diffuse reflection, refracted, convex lens, concave lens, prism, filter, colour, primary colour, secondary colour,</p> <p><b>Reading:</b> Following a written method and read risk assessments. Students may be directed to the textbook; this could be in lesson or at home on Kerboodle.</p> <p><b>Writing:</b> Describing and explaining scientific phenomenon, free response writing for describing precautions taken, use of word mat to promote sentence formation.</p> <p><b>Oracy:</b> inclusion of BEST resources which are research evidence on common misunderstandings in science, effective diagnostic questioning and formative assessment, constructivist approaches</p>

	to building understanding, and effective sequencing of key concepts that promote metacognitive talk and dialogue.
<b>Becoming future ready</b>	<b>Careers/Employability:</b> <ul style="list-style-type: none"> <li>- <i>electrician</i></li> <li>- <i>sound engineer</i></li> <li>- <i>optician</i></li> <li>- <i>Ophthalmologist</i></li> <li>- <i>Audiologist</i></li> </ul>
<b>Adaptation</b>	Throughout this topic, quality first teaching will provide differentiation:
<b>QFT/SEND Provision</b>	<p><b>By product:</b> Linear assessments and differentiated practical work.</p> <p><b>By resource:</b> Lessons are differentiated per class and students, worksheets are coloured blue if support and assessments are linear.</p> <p><b>By Intervention:</b> by providing different levels of supervision and support</p> <p><b>By Progressive Questioning:</b> exploring pupils' understanding through interactive dialogue.</p> <p><b>By Grouping:</b> according to prior attainment, gender, social preference, preferred learning style.</p> <p><b>By Task:</b> Pupils should be involved in the identification of targets which are meaningful to them and in the selection of an appropriate task from the given range.</p> <p><b>By Offering Optional Activities:</b> In class or as homework, to extend learning.</p> <p>This QFT/SEND provision will be explicit within the lesson-by-lesson schemes of work.</p>
<b>Implementation Curriculum Delivery</b>	To be able to:
<b>Learning Outcomes (Core Knowledge)</b>	<p><i>Know</i></p> <ul style="list-style-type: none"> <li>- Recall that waves transfer energy without transferring matter</li> </ul> <p><i>Apply</i></p> <ul style="list-style-type: none"> <li>- Describe the difference between a longitudinal and a transvers wave</li> <li>- Label key parts of a transvers and longitudinal wave diagram</li> </ul>
	<p><i>Know</i></p> <ul style="list-style-type: none"> <li>- Name some sources of sound.</li> <li>- Name materials that sound can travel through.</li> <li>- State that sound travels at 330 m/s in air, a million times more slowly than light.</li> <li>- Use data to compare the speed of sound in different materials.</li> </ul> <p><i>Apply</i></p> <ul style="list-style-type: none"> <li>- Describe how sound is produced and travels.</li> <li>- Explain observations where sound is transmitted by different media.</li> <li>- Contrast the speed of sound and the speed of light.</li> <li>- Compare the time for sound to travel in different materials using data given.</li> </ul> <p><i>Extend</i></p> <ul style="list-style-type: none"> <li>- Explain what is meant by supersonic travel.</li> <li>- Describe sound as the transfer of energy through vibrations and explain why sound cannot travel through a vacuum.</li> <li>- Compare the time taken for sound and light to travel the same distance.</li> <li>- Explain whether sound waves from the Sun can reach the Earth.</li> </ul>
	<p><i>Know</i></p> <ul style="list-style-type: none"> <li>- Define amplitude, frequency, and wavelength.</li> <li>- State the link between loudness and amplitude.</li> <li>- State two things that can happen when sound goes through matter or hits a boundary.</li> <li>- Label amplitude on a diagram of an oscilloscope trace of a wave.</li> </ul> <p><i>Apply</i></p> <ul style="list-style-type: none"> <li>- Explain observations of how sound travels using the idea of a longitudinal wave.</li> <li>- Describe the link between loudness and amplitude, using diagrams.</li> <li>- Explain what happens when sound goes through matter or hits a boundary.</li> <li>- Describe how to find the amplitude of a wave from an oscilloscope trace.</li> </ul> <p><i>Extend</i></p> <ul style="list-style-type: none"> <li>- Explain how you can make measurements of the amplitude of a sound wave.</li> <li>- Compare and contrast waves of different loudness using a diagram.</li> <li>- Describe in detail the behaviour of sound as it travels in matter or hits a boundary.</li> <li>- Use an oscilloscope on a variety of settings of p.d./division to find the amplitude of a sound wave.</li> </ul> <p><i>Know</i></p> <ul style="list-style-type: none"> <li>- Define auditory range.</li> <li>- State the difference between frequency and pitch.</li> <li>- Label time period on a diagram of a sound wave on an oscilloscope.</li> </ul> <p><i>Apply</i></p> <ul style="list-style-type: none"> <li>- Describe the auditory range of humans.</li> <li>- Describe the link between frequency and pitch.</li> </ul>

- Describe how to find the frequency of a wave from an oscilloscope trace.
- Extend*
- Present a reasoned prediction using data of how sounds will be differently heard by different animals.
  - Compare and contrast waves of different frequency using a diagram.
  - Use an oscilloscope on a variety of settings of s/div to find the period and frequency of a sound wave.

- Know*
- Define amplitude, frequency, and wavelength.
  - State the link between loudness and amplitude.
  - State two things that can happen when sound goes through matter or hits a boundary.
  - Label amplitude on a diagram of an oscilloscope trace of a wave.

- Apply*
- Explain observations of how sound travels using the idea of a longitudinal wave.
  - Describe the link between loudness and amplitude, using diagrams.
  - Explain what happens when sound goes through matter or hits a boundary.
  - Describe how to find the amplitude of a wave from an oscilloscope trace.

- Extend*
- Explain how you can make measurements of the amplitude of a sound wave.
  - Compare and contrast waves of different loudness using a diagram.
  - Describe in detail the behaviour of sound as it travels in matter or hits a boundary.
  - Use an oscilloscope on a variety of settings of p.d./division to find the amplitude of a sound wave.

- Know*
- Define auditory range.
  - State the difference between frequency and pitch.
  - Label time period on a diagram of a sound wave on an oscilloscope.

- Apply*
- Describe the auditory range of humans.
  - Describe the link between frequency and pitch.
  - Describe how to find the frequency of a wave from an oscilloscope trace.

- Extend*
- Present a reasoned prediction using data of how sounds will be differently heard by different animals.
  - Compare and contrast waves of different frequency using a diagram.
  - Use an oscilloscope on a variety of settings of s/div to find the period and frequency of a sound wave.

- Know*
- Describe some ways that light interacts with materials.
  - State the speed of light.
  - State the positions of the Earth, Moon, and Sun during a solar eclipse.

- Apply*
- Describe what happens when light interacts with materials.
  - Explain how ray diagrams can explain the formation of shadows.
  - Use ray diagrams to describe what observers see during an eclipse.

- Extend*
- Predict how light will interact with different materials. - Use ray diagrams to explain what observers see during an eclipse.

- Know*
- With guidance, construct ray diagrams to show how light reflects off mirrors and forms images.
  - Identify examples of specular and diffuse reflection.
  - Use appropriate equipment safely with guidance.

- Apply*
- Explain how images are formed in a plane mirror using a ray diagram.
  - Explain the difference between specular and diffuse reflection.
  - Use appropriate equipment and take readings safely without help.

- Extend*
- Use a ray diagram to explain how an image in a mirror changes as you move the mirror/object, or to explain the formation of images in multiple mirrors.
  - Predict how light will reflect from different types of surface.
  - Take accurate readings using appropriate equipment and working safely.

- Know*
- Describe what happens when light is refracted.
  - State a difference between what happens to light when it goes through a convex lens and a concave lens.
  - Record some observations as a diagram with help.

- Apply*
- Use a ray diagram to describe how light travels through a transparent block.



- Use a ray diagram to describe what happens when light travels through a convex or concave lens.
- Record observations using a labelled diagram.

*Extend*

- Predict whether light will refract when it hits a surface.
- Draw ray diagrams to show what happens when light goes through a convex or concave lens.
- Record observations using labelled diagrams, and apply this to other situations.

*Know*

- Name parts of the eye.
- Name two problems that people can have with their vision.
- Describe problems people have with their eyesight.

*Apply*

- Describe how the eye works.
- Name the lens used to correct short sight, and the lens used to correct long sight.
- Describe how lenses correct short-sight and long-sight.

*Extend*

- Explain how the eye forms an image.
- Explain how lenses correct vision.
- Use ideas about refraction to explain the action of lenses in glasses and contact lenses.

*Know*

- State what happens to light when it passes through a prism.
- State the difference between colours of light in terms of frequency.
- State the effect of coloured filters on light.
- Predict how red light will appear on a white surface.

*Apply*

- Explain what happens when light passes through a prism.
- Describe how primary colours add to make secondary colours.
- Explain how filters and coloured materials subtract light.
- Predict the colour of objects in red light and the colour of light through different filters.

*Extend*

- Explain why a prism forms a spectrum.
- Explain the formation of secondary colours.
- Predict how coloured objects will appear given different coloured lights and filters.
- Predict the colour of objects in lights of secondary colours, giving a reason for the prediction.

**Current learning to be developed in the future within:**

**Before:** In KS2 you learnt that recognise that they need light in order to see things and that dark is the absence of light and shadows are formed when the light from a light source is blocked by an opaque object and how sounds are made, associating some of them with something vibrating and recognise that vibrations from sounds travel through a medium to the ear.

**Future:** At GCSE the topics of light and sound will come into a unit about waves. Wave behaviour is common in both natural and man-made systems. Waves carry energy from one place to another and can also carry information.

**Assessment**

Refer to assessment maps for formative and summative assessment opportunities.

**Impact**

Attainment and Progress – Refer to assessment results / data review documentation.