



Big Question: What are waves?

AoLE: Science and Technology	Subject: Science – Biology	Year: 9
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Big Question / Aim / Objective / Concept	Vision (Proposed outcome) / Purpose of curriculum	Prior knowledge / Learners previous knowledge
What are waves?	In this topic students are going to look at waves. They will start with the overall basics of waves. They will then move onto the idea of light investigating reflection and refraction. Also looking into the concept of colour and how we see things. Students will then look into sound, how sound is created and how the pitch and volume can be impacted. Finally students will look into the properties and uses of the EM spectrum.	<ul style="list-style-type: none"> <li>Be able to identify light sources</li> <li>• Know that light cannot pass through some materials, and how this leads to the formation of shadows</li> <li>• Be able to use mirrors and know about reflective surfaces</li> <li>• Know that we see things only when light from them enters the eyes</li> <li>• Know that sounds are made when objects vibrate but that vibrations are not always directly visible</li> <li>• Be able to change the pitch and loudness of sounds produced by some vibrating objects</li> <li>• Know that vibrations from sound sources require a medium through which to travel to the ear</li> <li>• Know that sound causes the eardrum to vibrate and that some loud sounds can cause temporary deafness.</li> </ul>

What does progression look like in this Big Question?

Progression Indicator	Description of learning (What matters statements)	Student evidence of progression (Blooms) / Knowledge
Excelling	I can use waves in order to learn more about the world around me. I can explain how and why various categories of waves are used for different applications. I can apply understanding of waves to ask questions and solve problems.	Analyse reflection diagrams Analyse refraction diagrams Analyse how frequency impacts the pitch of a sound Analyse how amplitude impacts the volume of a sound
Advancing	I can predict the behaviour of waves in different circumstances I can describe and explain the properties of different types of matter and relate these to how they are used. I can use a range of models to explain and make predictions.	Explain what light is Explain what sound is Explain the structure of the eye Explain the structure of the ear
Securing	By manipulating the properties of sound and light, I can produce a desired effect. I can identify questions that can be investigated scientifically and suggest suitable methods of inquiry.	Describe reflection Describe refraction Describe frequency Describe amplitude
Beginning	I can explain how the properties of sound and light will affect how they are experienced. I can explore and communicate the basic properties of light, sound	Recall the two types of wave Recall the light spectrum Recall the EM spectrum



Authentic learning experiences (Local / National / International)	Skills (Literacy / Numeracy / DCF) / Cross Curricular links
<p><b>Local Context</b> Light and sound play integral parts in film, music and theatre productions. Storyhouse is a key contributor to young people's lives in the area. Possessing technical knowledge of how these function can be key to careers in the arts at a technical level.</p> <p>Pupils will work on how light and sound are used to compose images, from the use of pinhole cameras and lens to the combining of colours using filters and the production and manipulation of sounds.</p> <p>There are also opportunities for pupils to learn about key Welsh scientists such as Isaac Roberts who was the first scientist to be able to capture a clear deep space photograph of the Andromeda Galaxy. Edward "Taffy" Bowen was a notable scientist and engineer who worked on developing early radar, which would give the RAF a massive advantage in the battle of Britain.</p> <p><b>National Context</b> Pupils will investigate how science developed the use of the cameras through the understanding of light. Pupils will carry out investigations similar to those undertaken by British scientist Sir Issac Newton and his work on how light travels and how it can be dispersed to separate light into its components.</p>	<p><b>Numeracy</b></p> <ul style="list-style-type: none"> <li>• Measurement of angles using a protractor.</li> <li>• Construction of accurate drawings using the identification of acute, right angles, obtuse and reflex angles.</li> <li>• Calculation of the speed of sound using <math>s=d/t</math> equation.</li> <li>• Calculator of frequency in hertz by identifying cycles per second</li> <li>• Calculation of wave speed using <math>v=f\lambda</math></li> <li>• Introduction to standard form in the above calculations</li> <li>• Measurement of amplitude, wavelength of a waveform</li> </ul> <p><b>Literacy</b></p> <ul style="list-style-type: none"> <li>• Discussion on the scientific development of the camera.</li> <li>• Development of the definitions for the laws of reflection and refraction</li> <li>• Describe and explain using connectives to structure reasoning.</li> <li>• Focus on the command word of describe for the processes of reflection, refraction and dispersion.</li> <li>• Extended writing formalising sentences and structuring paragraphs. Pupils use connectives to explain their reasoning.</li> <li>• Summarise information.</li> <li>• Use oracy skills to present and discuss information.</li> </ul> <p><b>Cross Curricular Links: Art</b> The use of colour and photography to construct pictures and videos in monochrome and colour composites.</p>

Assessment (How will we know that students have learnt what we taught them?)	
<p><b>Formative assessment:</b></p> <ul style="list-style-type: none"> <li>• Teacher circulating</li> <li>• Q&amp;A discussions on various phenomenon and scientific understanding</li> <li>• Identify key terms to definitions/examples</li> <li>• Peer/self-assessment tasks</li> <li>• Group experimental work</li> <li>• Explanations of specific processes such as conduction, convection and radiation</li> <li>• Lesson tasks such as measuring angles precisely allows the use of whiteboards or tasks that feedback to the teacher to ensure pupils have learnt the desired process</li> </ul>	<p><b>Summative assessment:</b></p> <p>Written assessment mid-point Describe and explain the parts of the electromagnetic spectrum</p> <p>Summative Assessment End of topic</p> <p>End of topic test Waves and EM Spectrum</p>



Strengths	Areas for Development	Pupil Voice