

Unit 3 Physics - Section 3.5&6

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| What are sound waves? | They are mechanical vibrations that can be detected by the human ear. |
| What is amplitude? | The maximum displacement from the mean position ('height' of the wave from the mid line) - measured in metres. |
| What is frequency? | The number of vibrations per second - measured in hertz (Hz). |
| What frequencies can be detected by the human ear? | The frequency range of 20-20,000 Hz. |
| What is a transducer? | A piece of equipment that changes an energy form into another one (usually one of them is electricity). |
| Name a transducer that changes sound energy into electrical energy? | A microphone. |
| Name a transducer that changes electrical energy into sound energy? | A speaker |
| On an oscilloscope trace of a sound what does the amplitude represent? | The loudness of the sound: big amplitude - loud sound; small amplitude - quiet sound. |
| On an oscilloscope trace of a sound what does the period represent? | A small period (high frequency) means a high pitched sound; a large period (low frequency) means a low pitched sound. |
| What causes sound? | Sound is caused by mechanical vibrations (vibrations of atoms or molecules) and travels as a wave - passing the vibrations on atom to atom. |
| What can't sound travel through?... and why? | Sound cannot travel through a vacuum - because there are no particles to pass the vibrations on through. |
| What is pitch of sound related to in the waveform? | The pitch of a note increases as the frequency increases. |
| What is loudness of sound related to in the waveform? | The loudness of a note increases as the amplitude of the wave increases. |
| What does the shape of the wave have an effect on? | The quality of a note depends upon the waveform shape. |
| What is the reflection of sound called? | An echo. |
| What is true about sound waves that have been reflected? | The angle of incidence = the angle of reflection |
| What medium does sound travel fastest in, and why? | Solids - because the more densely packed the particles the quicker the energy gets passed on. |
| What happens as sound goes into a denser medium? | It speeds up and therefore refracts (bending towards the normal). |
| What is ultrasound? | Mechanical vibrations that are at a higher frequency than humans can hear (frequencies of greater than 20 kHz) |
| How do we make ultrasound waves? | We use electronic systems to produce ultrasound waves. |
| What happens when ultrasound waves meet a boundary between two different media? | Ultrasound waves are partially reflected when they meet a boundary between two different media. |
| How do we determine how far away a boundary between two media is? | We take echo soundings. The time taken for the ultrasound to reach the boundary and then be reflected back to reach a detector can be used to measure of how far away such a boundary is. You find the time and then use $speed = distance/time$. |
| Give two industrial uses of ultrasound. | Ultrasound waves can be used in industry for cleaning (they make a liquid vibrate and 'shake loose' dust particles) and for quality control (detecting cracks - ultrasound is reflected from the air in the crack). |
| Why is ultrasound useful in medical scanning? | It is non-invasive (you don't cut the patient open) and non-ionising (it doesn't increase the probability of the patient getting cancer). |
| Give the main medical use of ultrasound. | Ultrasound waves can be used in medicine for pre-natal scanning. The size of the baby, stage of the pregnancy and the structure of the heart and spinal column etc. can be seen without hurting the baby. |