

### Unit 3 Physics - Section 3.5&6

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.