Edexcel Physics A-level

CP06 - Determine the Speed of Sound in Air

Practical Flashcards

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What equation links wave speed, frequency and wavelength?

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$$v = f\lambda$$

Speed (ms^{-1}) = Frequency (Hz) x Wavelength (m)

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How can the frequency of a signal be measured from the oscilloscope?

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How can the frequency of a signal be measured from the oscilloscope?

The time between two identical points on adjacent waves can be measured from the time-axis. This is the time period of the signal. The frequency is given by the inverse of the time period.

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What two traces should be displayed on the oscilloscope screen?

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What two traces should be displayed on the oscilloscope screen?

Both the signal sent to the loudspeaker and the signal taken in by the microphone should be displayed on the oscilloscope screen.

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Describe what happens to the two traces as the distance between the speaker and microphone is increased.

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Describe what happens to the two traces as the distance between the speaker and microphone is increased.

The two traces will move past each other and the phase between the traces will change.

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What piece of apparatus should be connected to the loudspeaker to produce a tone?

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What piece of apparatus should be connected to the loudspeaker to produce a tone?

A signal generator should be connected to the loudspeaker. This generator should also be connected to the oscilloscope so that its signal trace is displayed.

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Describe how the speaker and microphone traces should be positioned on the oscilloscope display.

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Describe how the speaker and microphone traces should be positioned on the oscilloscope display.

The spacing of the two signals inputted into the oscilloscope should be changed so that one is directly above the other. A peak of the lower trace should be inline with a trough of the upper trace.

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How should the initial separation of the speaker and microphone be set?

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How should the initial separation of the speaker and microphone be set?

The separation should adjusted so that a trough on the upper trace touches the peak of the lower trace. This distance should then be measured using a metre ruler.

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How can the wavelength be determined by moving the speaker away from the microphone?

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How can the wavelength be determined by moving the speaker away from the microphone?

The speaker should be moved away from the microphone until the trace has moved to a point where the peak of the lower trace once again touches a trough of the upper trace. The distance moved to achieve this is the wavelength.

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What uncertainties are involved in this experiment?

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When determining the frequency, there is an uncertainty produced by the resolution of the oscilloscope scale. The traces also have a thickness and so there will be an uncertainty in positioning the speaker exactly at a complete cycle each time.

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Suggest how the frequency values used in this experiment should be chosen.

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Suggest how the frequency values used in this experiment should be chosen.

The frequency values need to be chosen so that the waves have a wavelength easily measurable to a good resolution with a metre ruler. Frequencies around 4kHz are suitable choices.

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How should the scales on the oscilloscope be set when carrying out this experiment?

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How should the scales on the oscilloscope be set when carrying out this experiment?

The scales should be set so that each trace displays around 3 complete wave cycles on the screen.

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Why does the traces moving past each by a complete cycle signify that the speaker has moved by a wavelength?

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Why does the traces moving past each by a complete cycle signify that the speaker has moved by a wavelength?

One complete cycle on the oscilloscope represents the wave's time period. The distance that the wave travels in this time is the wavelength.

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Why is it advantageous to measure the frequency from the oscilloscope rather than using the value given by the signal generator?

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Why is it advantageous to measure the frequency from the oscilloscope rather than using the value given by the signal generator?

A greater resolution will be obtained by measuring from the oscilloscope.

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