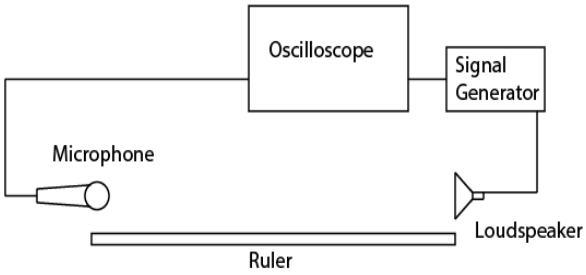
Edexcel Physics A Level

Core Practical 6

Determine the Speed of Sound in Air

Method



- Set timebase on oscilloscope to 100 ms/cm, and y-gain 0.1 volts/cm
- Connect microphone to input on oscilloscope, activate second beam mode
- Place microphone in front of the speaker and set signal generator to 1000Hz
- Place a metre ruler between the signal generator and microphone
- Move the microphone away from the loudspeaker, until the microphones wave has moved one full wavelength along the signal generator's wave, so the peaks and troughs line up
- Measure the distance using the metre ruler as one wavelength
- Keep moving microphone back and recording the distances at which the traces line up until 1 metre is reached
- Convert the measured distances so as to record the length of one complete wavelength
    - for the 2nd result divide length by 2 for one wavelength
    - for the 3rd result divide length by 3 for one wavelength etc.
- Find the mean wavelength
- On the oscilloscope, find the time period (number of squares for 1 wavelength x timebase) then invert (1/time period) to find actual frequency being produced
- Vary the frequency on the signal generator to 2000Hz and 3000Hz and repeat procedure as above
- Calculate the speed of sound at each frequency using $v=f\lambda$ and determine the mean speed of sound

Safety

- Hearing protection used as high frequency sound can be painful to listen to for long periods of time
- Sound not too loud to avoid ear damage

Evaluation

- Changing the timebase until only 1 wavelength is shown, reduces uncertainty in measurements
- Finding the frequency from the oscilloscope overcomes uncertainties in the signal generator
- Make sure oscilloscope dial is in calibrate position
- The time interval is very small, so maximise the distance between microphones