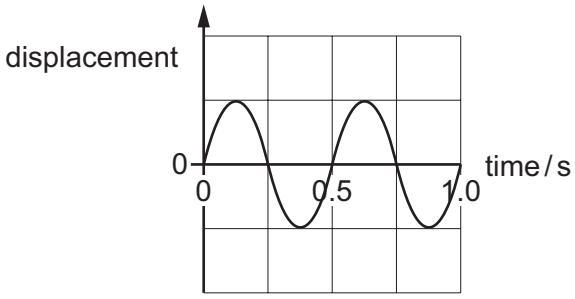
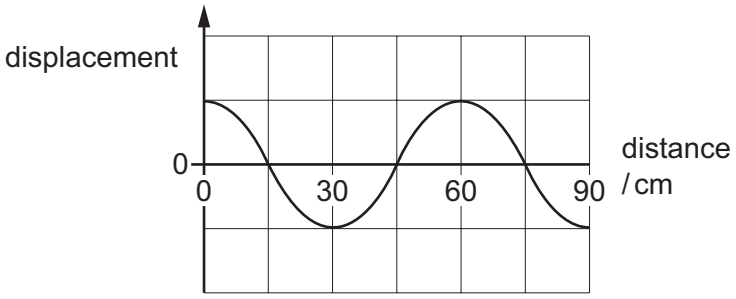
21 The two graphs represent the same wave.

Graph 1 shows the variation with time of the displacement at a particular distance. Graph 2 shows the variation with distance of the displacement at one instant.



graph 1

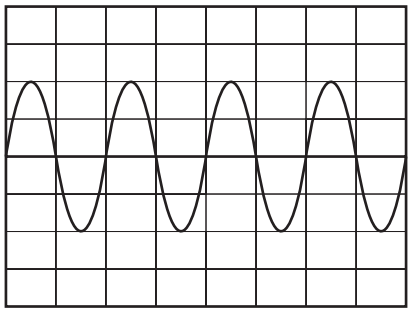


graph 2

What is the speed of the wave?

A 22.5 cm s^{-1} **B** 30.0 cm s^{-1} **C** 90.0 cm s^{-1} **D** 120 cm s^{-1}

22 A microphone is connected to a cathode-ray oscilloscope (CRO). When a tuning fork is struck and then held next to the microphone, the following waveform is shown on the display of the CRO.



The time-base setting on the CRO is 2.00 ms per division.

What is the best estimate of the frequency of the sound produced by the tuning fork?

A 63 Hz **B** 170 Hz **C** 250 Hz **D** 500 Hz

23 A loudspeaker emitting a constant frequency of 2000 Hz is swung in a horizontal circle with a speed of 15.0 m s^{-1}.

A stationary observer is level with the loudspeaker and situated a long distance from the loudspeaker. The observer hears a sound of varying frequency. The maximum frequency heard is 2097 Hz.

What is the speed of the sound in the air?

A 294 m s^{-1} **B** 309 m s^{-1} **C** 324 m s^{-1} **D** 330 m s^{-1}