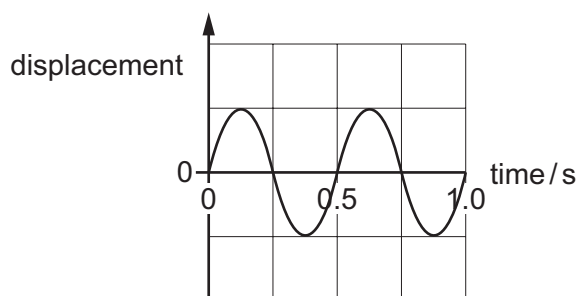
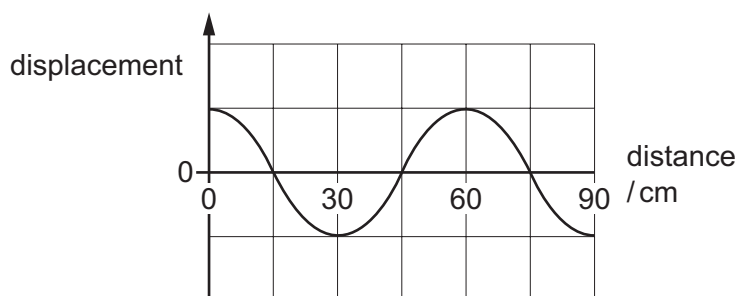


- 21** The two graphs represent the same wave.

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.



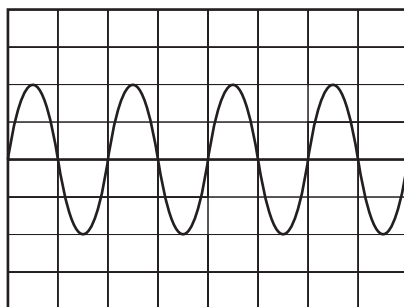
graph 1



graph 2

What is the speed of the wave?

- A**  $22.5 \text{ cm s}^{-1}$       **B**  $30.0 \text{ cm s}^{-1}$       **C**  $90.0 \text{ cm s}^{-1}$       **D**  $120 \text{ cm s}^{-1}$
- 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  $2.00 \text{ ms}$  per division.

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

- A**  $63 \text{ Hz}$       **B**  $170 \text{ Hz}$       **C**  $250 \text{ Hz}$       **D**  $500 \text{ Hz}$
- 23** A loudspeaker emitting a constant frequency of  $2000 \text{ Hz}$  is swung in a horizontal circle with a speed of  $15.0 \text{ m s}^{-1}$ .

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  $2097 \text{ Hz}$ .

What is the speed of the sound in the air?

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