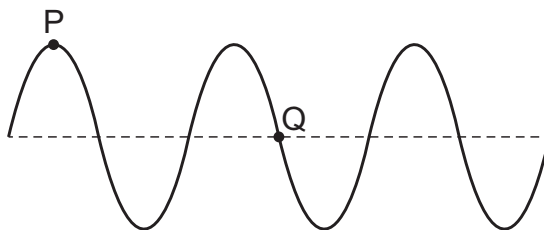
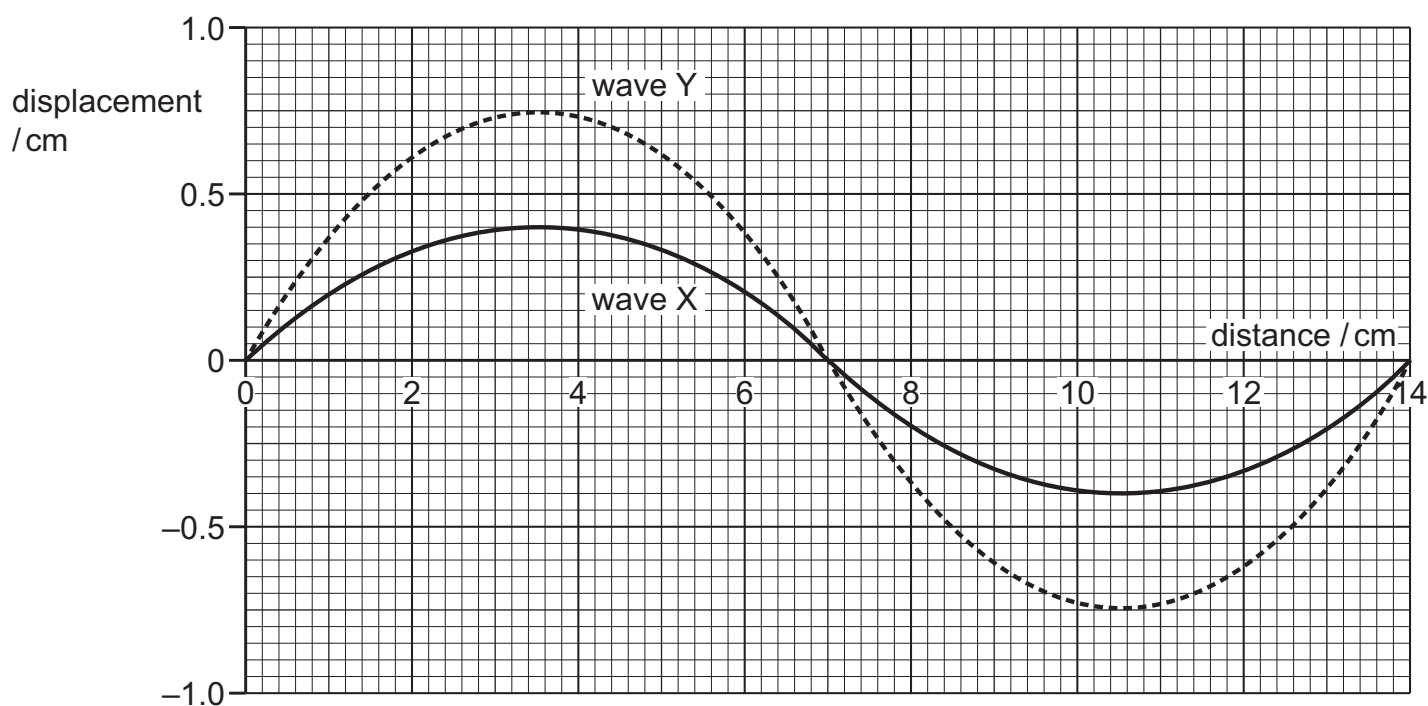


- 25 What is the phase difference between points P and Q on the progressive wave shown in the diagram?



- A 180° B 450° C 540° D 720°

- 26 The graph shows the variation of displacement with distance for two progressive waves X and Y of the same type in the same medium.



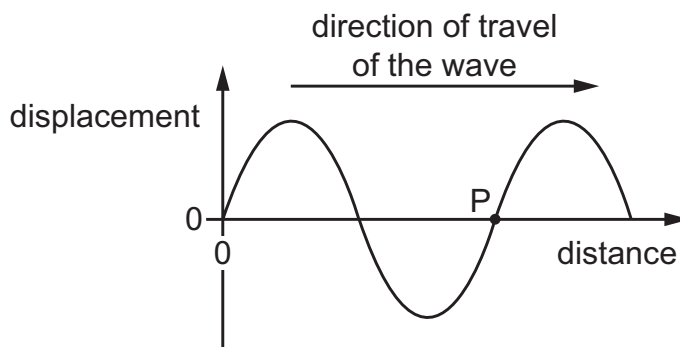
The intensity of wave X is I .

What is the intensity of wave Y?

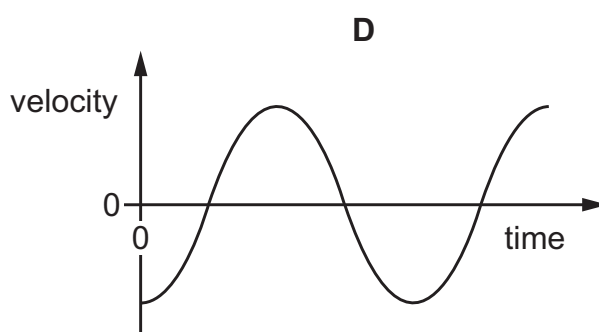
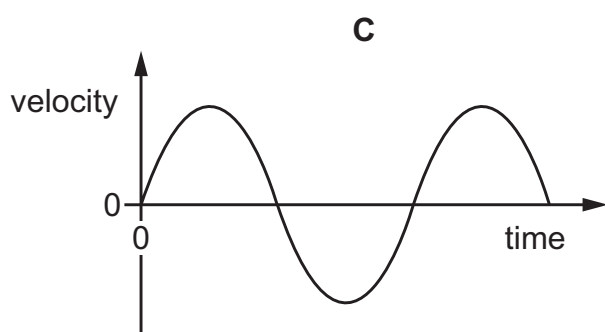
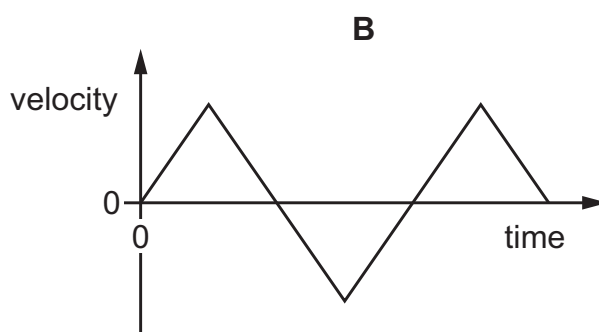
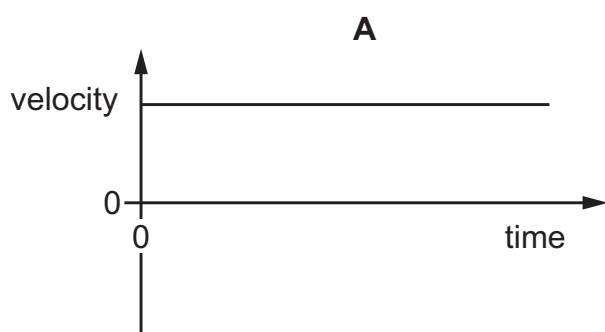
- A $0.28I$ B $0.53I$ C $1.9I$ D $3.5I$

24 A transverse progressive wave travels along a string.

The graph shows the variation with distance of the displacement of the string at time $t = 0$.



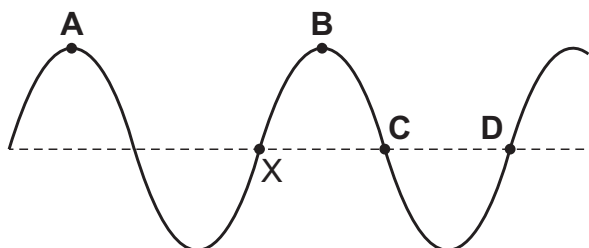
Which graph represents the variation with time of the velocity of point P on the string?



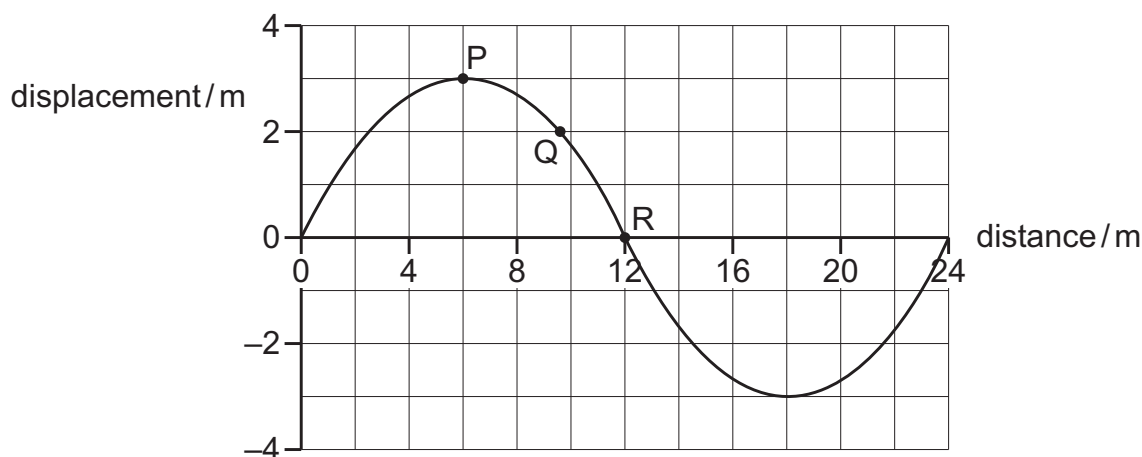
26 The diagram shows a progressive transverse wave on a stretched string at one instant in time.

One point on the string is labelled X.

Which point on the string is 270° out of phase with X?



- 24** The graph shows the variation with distance along the wave of the displacement of water particles at a particular instant in time for a transverse water wave.

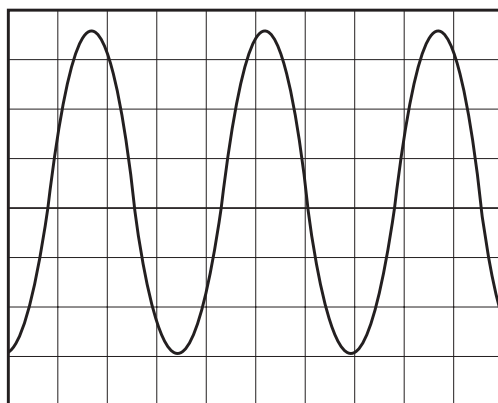


P, Q and R show the positions of three water particles in the wave.

Which particle has the greatest speed at the instant shown?

- A** all have the same speed
- B** particle P
- C** particle Q
- D** particle R

- 26** A wave is displayed on an oscilloscope.



The oscilloscope settings are:

time-base: $300 \mu\text{s div}^{-1}$

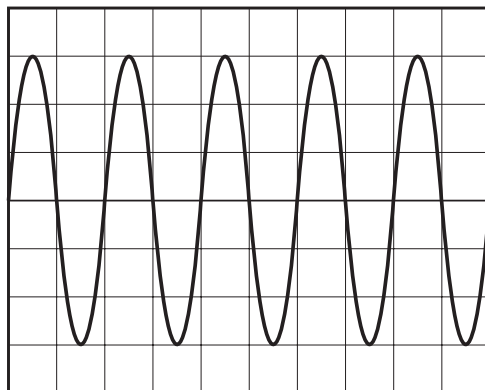
y-gain: $40 \mu\text{V div}^{-1}$.

What is the frequency of the wave?

- A** 130 Hz
- B** 950 Hz
- C** 1100 Hz
- D** 7100 Hz

- 20** A microphone is connected to a cathode-ray oscilloscope (CRO). The diagram shows the waveform on the display of the CRO when the microphone detects a sound.

The y -gain is set to 1 V div^{-1} . The time-base is set to 2.0 ms div^{-1} .



Which row gives the amplitude and frequency of the waveform?

	amplitude / V	frequency / Hz
A	3	125
B	3	250
C	6	125
D	6	250

- 5 (a) Use the definitions of speed v , frequency f and wavelength λ to derive the wave equation

$$v = f\lambda.$$

[2]

- (b) A source of sound waves of frequency 236 Hz is travelling at a constant velocity of 20 m s^{-1} .

A stationary observer has a microphone connected to a cathode-ray oscilloscope (CRO). The microphone detects the sound waves as the source moves directly towards the observer.

The resulting trace on the CRO is shown in Fig. 5.1.

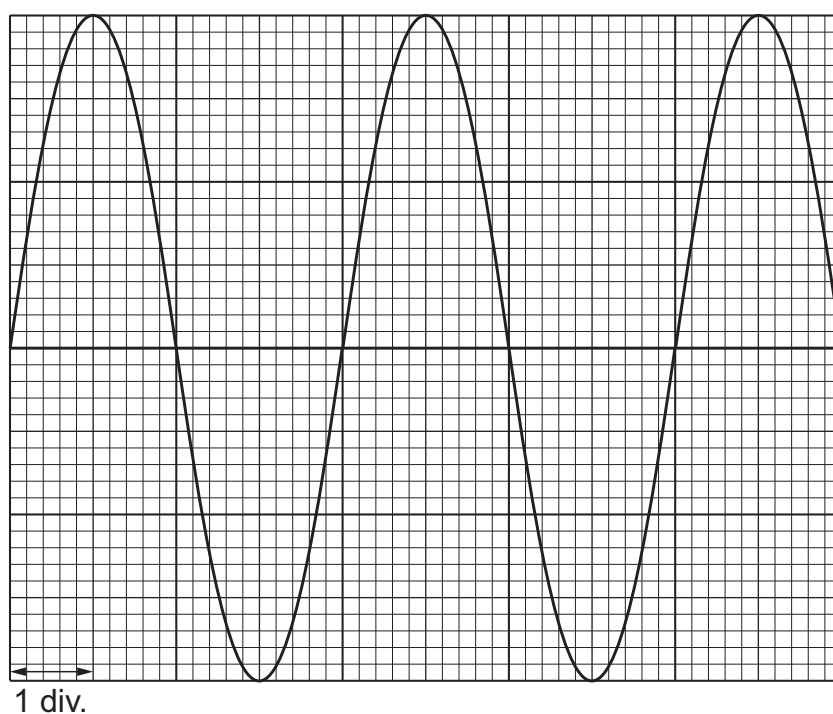


Fig. 5.1

The time-base on the CRO is set to 1.0 ms div^{-1} .

- (i) Calculate the frequency of the sound waves detected by the microphone.

frequency = Hz [2]

- (ii) Determine the speed of the sound in air.

speed of sound = ms^{-1} [2]

[Total: 6]

- 3 Two progressive water waves X and Y travel along a straight line from point A to point B. The variation of displacement of the waves with distance from A at an instant in time is shown in Fig. 3.1.

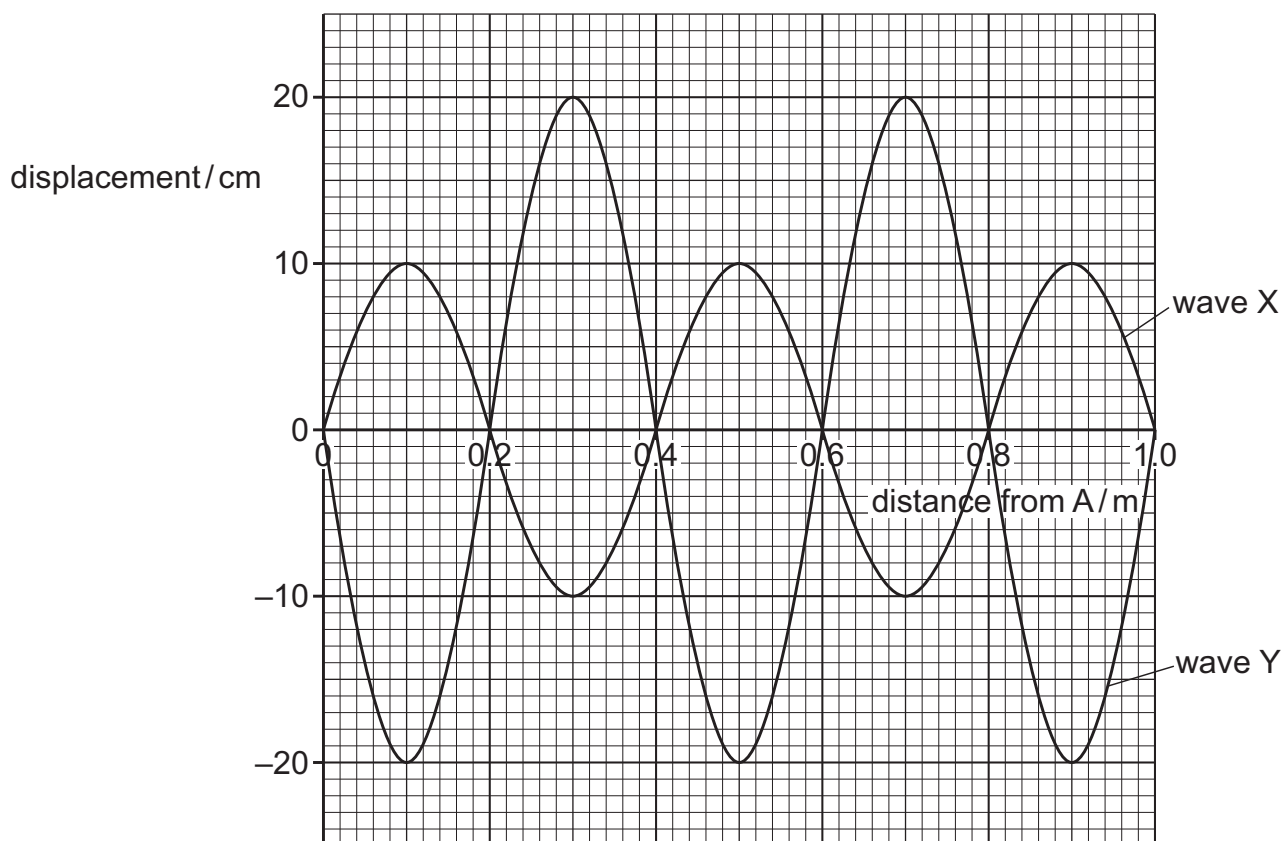


Fig. 3.1

- (a) State the amplitude of wave X.

amplitude = cm [1]

- (b) Both waves have frequency 16 Hz.

- (i) Determine the speed of wave X.

speed = ms^{-1} [2]

- (ii) State and explain whether X and Y are coherent.

.....
.....
..... [1]

- (c) Wave X and wave Y superpose to form a resultant wave.

On Fig. 3.2, sketch the variation of displacement of the resultant wave with distance from A at the instant of time shown in Fig. 3.1.

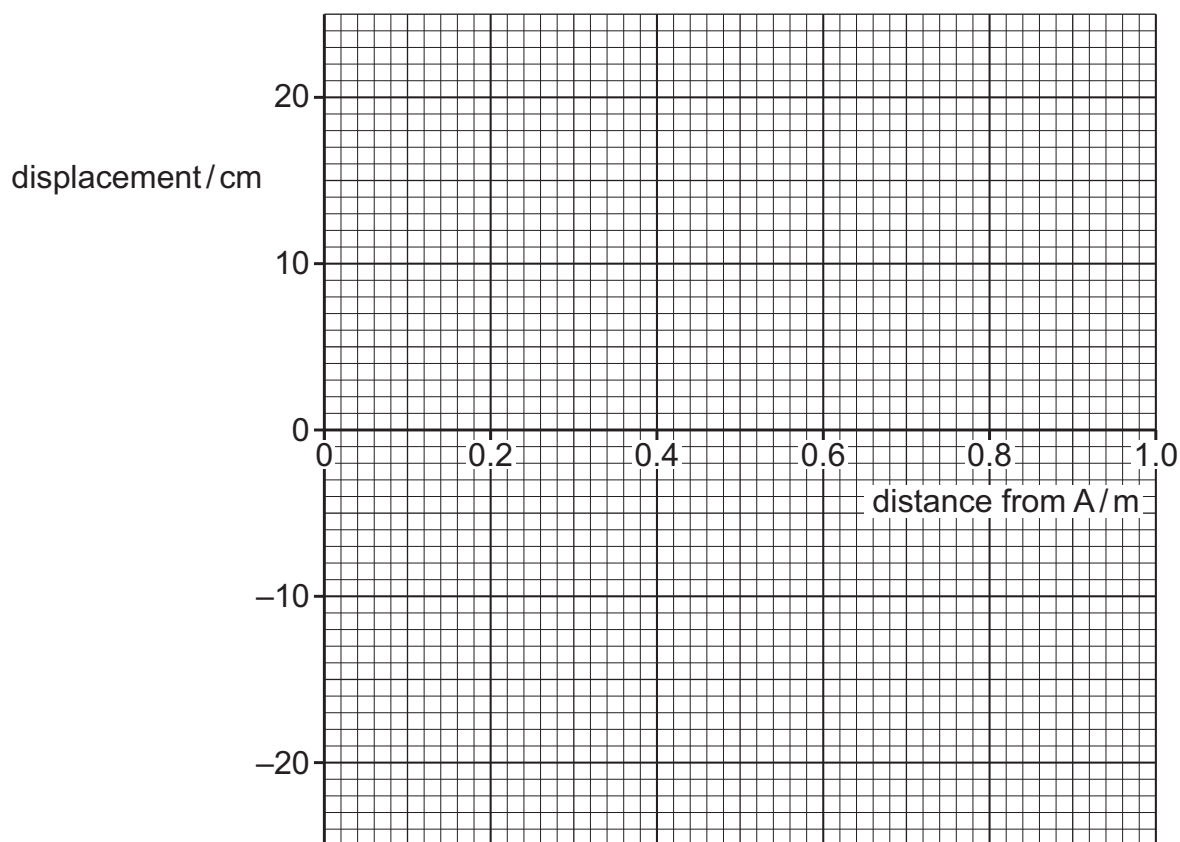


Fig. 3.2

[2]

- (d) The intensity of wave X is I_X . The intensity of wave Y is I_Y .

Use Fig. 3.1 to determine the ratio $\frac{I_X}{I_Y}$.

ratio = [2]

[Total: 8]

- 25 A progressive wave of frequency 300 Hz is travelling with a speed of 600 m s^{-1} .

What is the phase difference between two points on the wave that are a distance of 0.50 m apart?

- A 45° B 90° C 180° D 360°