

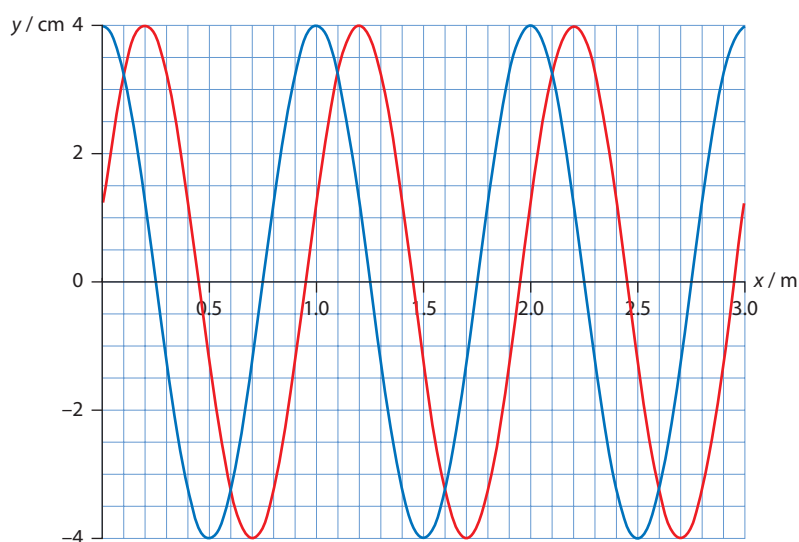
Self-test questions

Topic 4

- 1 A body of mass m is suspended at the end of a vertical spring. When the body is displaced from equilibrium by an amount A and then released, the body executes simple harmonic oscillations with period T . A second body of mass $4m$ is suspended from an identical spring. What will be the period of oscillations of this body when it is displaced by an amount $2A$?

A T
B $2T$
C $4T$
D $8T$

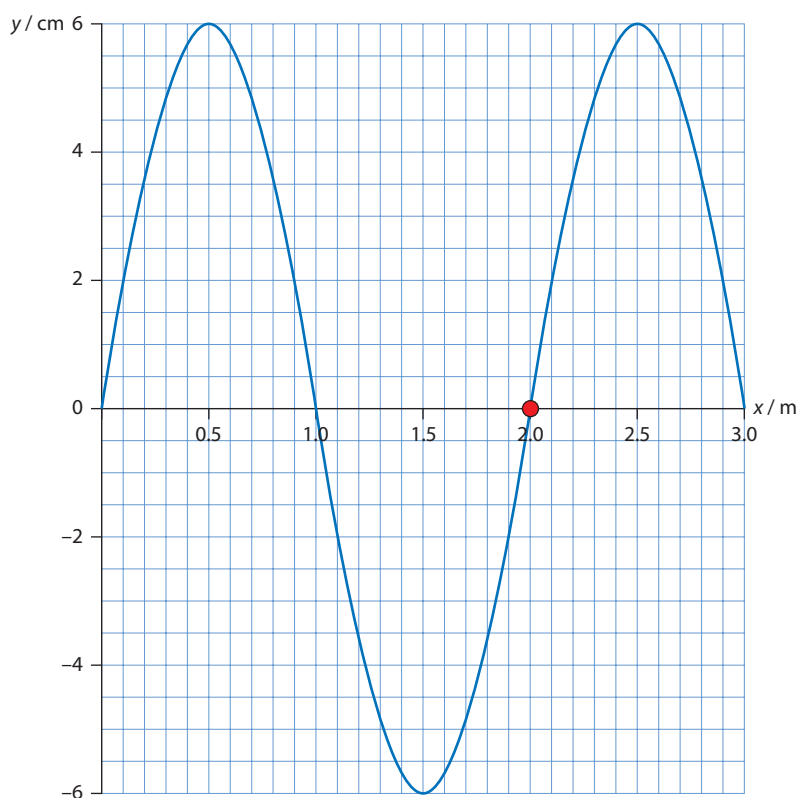
- 2 The diagram shows the displacement of a wave at time zero (in blue) and at time 0.5 s (in red).



What is the speed of the wave?

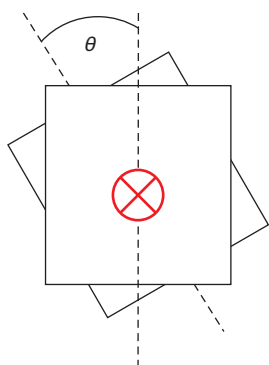
A 0.08 cm s^{-1}
B 5.0 m s^{-1}
C 0.40 m s^{-1}
D 0.04 cm s^{-1}

- 3 The diagram shows the variation with distance of the displacement of a longitudinal wave travelling from right to left. Positive displacements indicate motion to the right.



- A point in the medium has been marked. What is the direction of velocity of the marked point?
- A** Up
B Down
C Right
D Left
- 4 Which of the following wave phenomena cannot be observed for sound waves?
- A** diffraction
B refraction
C interference
D polarisation
- 5 A ray of light has wavelength λ in air. The ray passes into a medium of refractive index $\frac{4}{3}$. What is the wavelength of light in the new medium?
- A** λ
B 4λ
C $\frac{3\lambda}{4}$
D $\frac{4\lambda}{3}$
- 6 A ray of light passes through the eye of a needle. Which phenomenon is the transmitted light most likely to show?
- A** diffraction
B polarisation
C refraction
D absorption

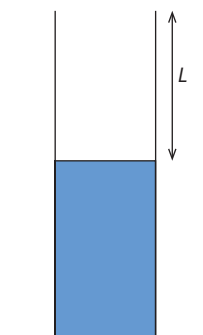
- 7 Vertically polarised light of intensity I_0 is incident on an arrangement of two parallel polarisers. The first polariser has its transmission axis vertical.



The angle between the transmission axes of the polariser is ϑ .

What is the intensity of the light transmitted through the second polariser?

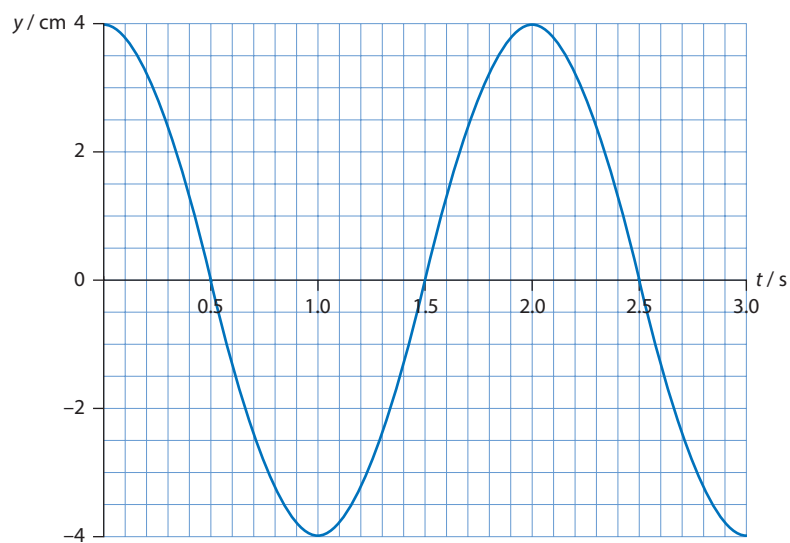
- A 0
 B $\frac{I_0}{2}$
 C $\frac{I_0}{2} \cos^2 \vartheta$
 D $I_0 \cos^2 \vartheta$
- 8 A tube X of length L_X has both ends open. A tube Y of length L_Y has one end closed and the other open. The frequency of the first harmonic in X is the same as the frequency of the first harmonic in Y. What is the ratio $\frac{L_X}{L_Y}$?
- A $\frac{2}{3}$
 B $\frac{3}{2}$
 C 2
 D $\frac{1}{2}$
- 9 A tuning fork is placed above a tube that is partially filled with water. The level of the water is slowly rising. A loud sound is heard from the tube when $L = 49$ cm and again when $L = 35$ cm.



At which value of L will a loud sound be heard again?

- A 42 cm
 B 28 cm
 C 14 cm
 D 7.0 cm

- 10 The diagram shows the displacement of a medium as a transverse wave of wavelength 5.0 m travels from left to right. What is the average speed of a point in the medium during one period of the wave and what is the speed of the wave?



	Average speed of point in medium	Wave speed
A	4.0 cm s^{-1}	2.5 m s^{-1}
B	2.5 m s^{-1}	8.0 cm s^{-1}
C	2.5 m s^{-1}	8.0 cm s^{-1}
D	8.0 cm s^{-1}	2.5 m s^{-1}