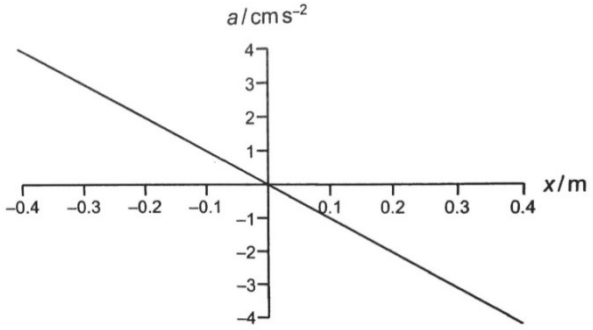
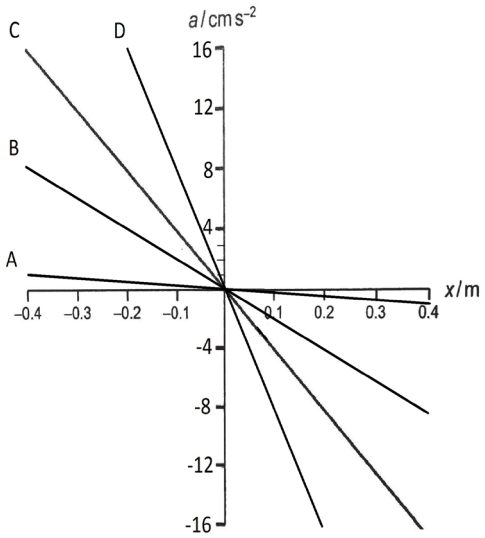
Raffles Institution
Year 5-6 Physics Department

2025 Year 6 H2 Physics Remedial
Chapter 10: Oscillations

1 The graph shows the variation of acceleration *a* with displacement *x* for an object undergoing simple harmonic motion.



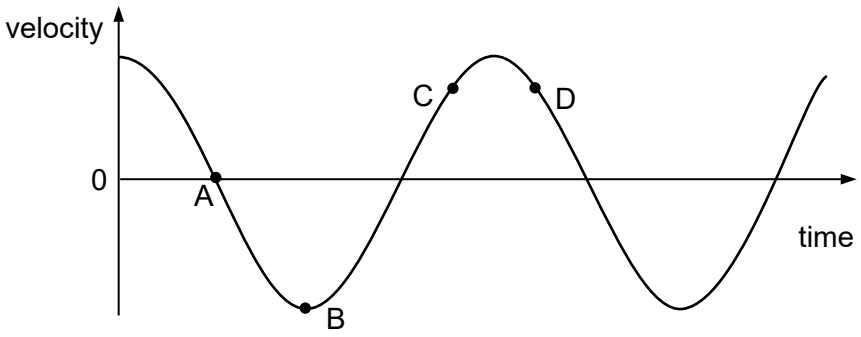
The simple harmonic motion system is altered so that it has a period half of that before. Which line shows the new variation of acceleration *a* with displacement *x* for the object?



[ACJC/Prelims 2014/P1/18]

2 The diagram shows the graph of velocity against time for a body performing simple harmonic motion.

At which point are the velocity and acceleration in opposite directions?



[DHS/Prelims 2014/P1/15]

3 The arrangement shown in Fig. 1.1 is used to determine the length *x* of a spring when different masses *M* are attached to the spring.

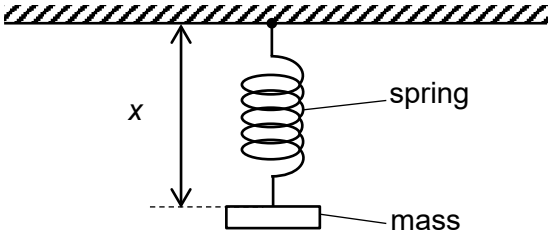


Fig. 1.1

The variation with length *x* of mass *M* is shown in Fig. 1.2.

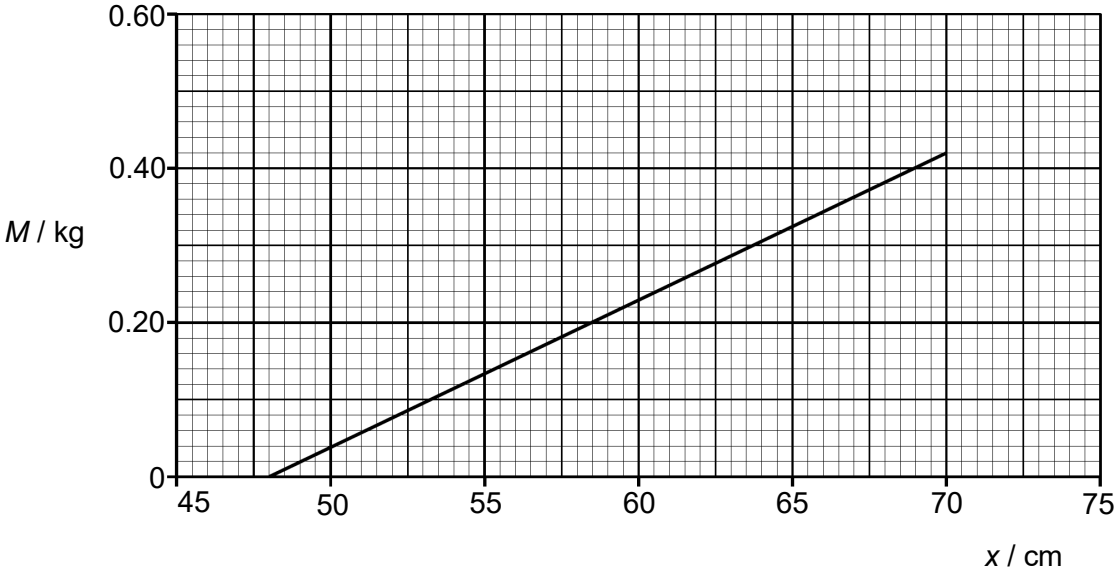


Fig. 1.2

(a) State the natural length of the spring. [1]

(b) Use Fig. 1.2 to determine the spring constant of the spring. [2]

A mass *m* is then attached to the spring. The mass is displaced vertically then released. The variation with time *t* of the displacement *y* from its mean position is shown in Fig. 1.3.

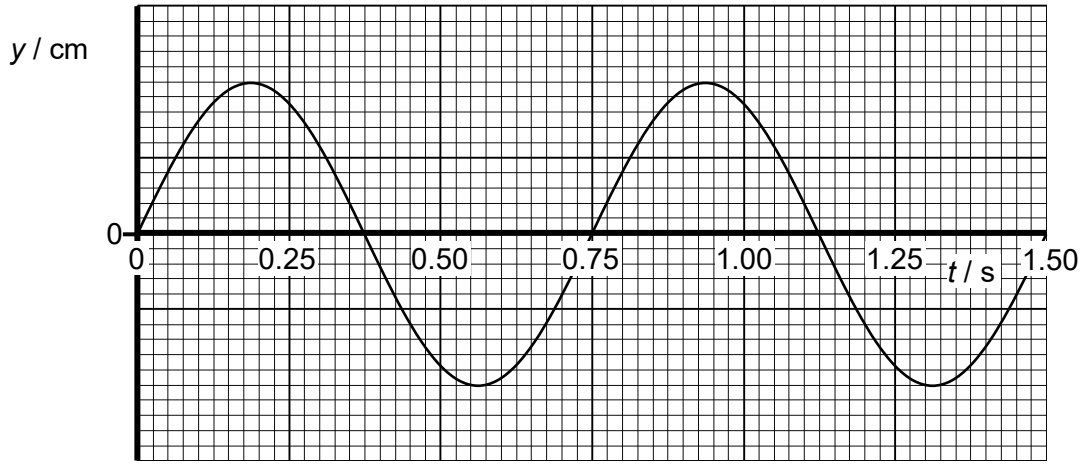


Fig. 1.3

(c) Calculate the angular frequency of the oscillation. [1]

(d) The spring-mass system undergoes free oscillations.

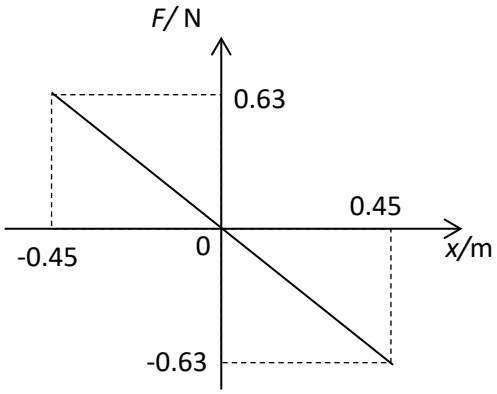
(i) Explain what is meant by *free* oscillations. [1]

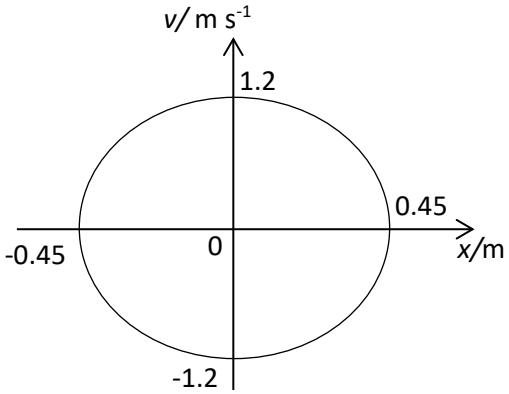
(ii) Determine the mass *m* that results in the oscillations shown in Fig. 1.3. [2]

(iii) Hence or otherwise, find the length *x* of the spring at *y* = 0 cm. [1]

[DHS/Prelims 2014/P3/1]

4 A mass of mass *m* was suspended from the bottom of a vertical spring, and set into oscillation with a period *T*. Measurements were made, and the <u>*resultant*</u> force *F* acting on the mass, and its velocity *v* were obtained. The graphs below were then plotted to show how *F* and *v* vary with the displacement *x* of the mass from its equilibrium position.





Calculate:

(a) the period of the oscillation, and

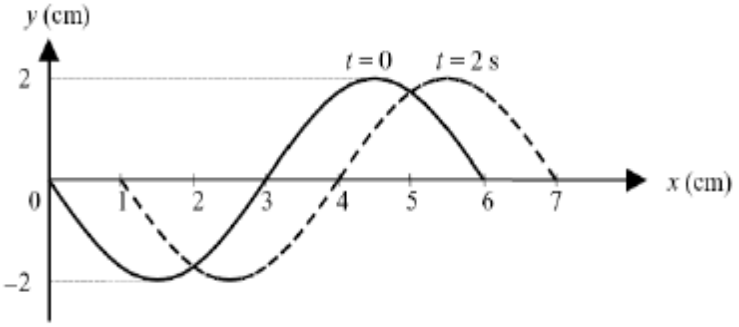
(b) the mass *m*.

[4]

[VJC/Prelims 2014/P2/1]

Chapter 11: Wave Motion

1 The figure below shows the positions of a travelling wave at time intervals $t = 0$ and $t = 2$ s.



Calculate the speed of the wave.

A 0.5 cm s^{-1}

B 2.0 cm s^{-1}

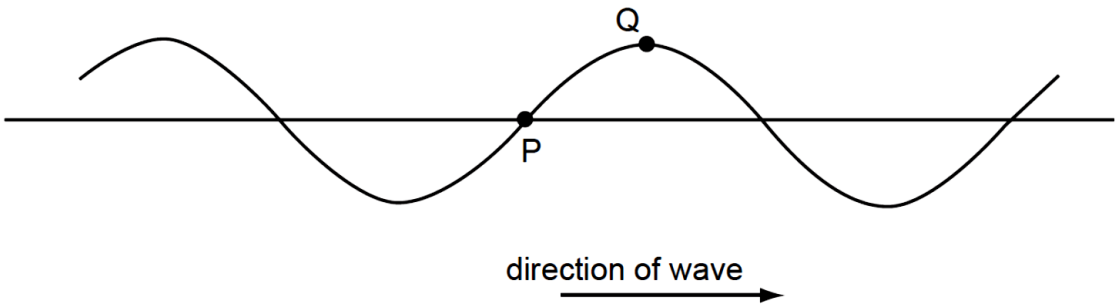
C 0.5 m s^{-1}

D 2.0 m s^{-1}

[JJC/Prelims 2014/P1/25]

2 The diagram shows a transverse wave on a rope. The wave is travelling from left to right.

At the instant shown, the points P and Q on the rope have zero displacement and maximum displacement respectively.

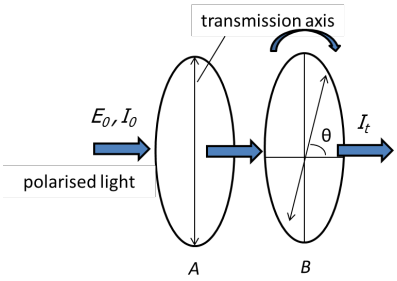


Which of the following describes the direction of motion, if any, of the points P and Q at this instant?

	point P	point Q
A	downwards	downwards
B	downwards	stationary
C	upwards	downwards
D	to the right	to the right

[NYJC/Prelims 2014/P1/19]

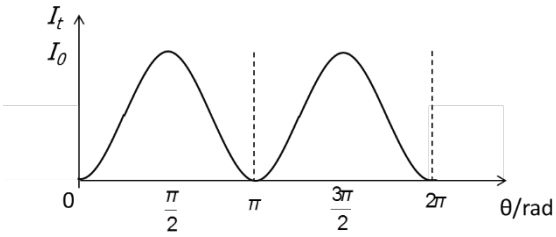
3 The figure below shows two ideal polarisers *A* and *B* where their transmission axes are initially parallel to each other.



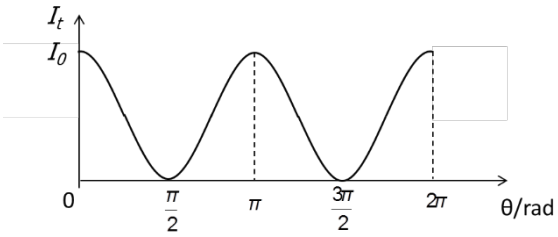
Polarised light of amplitude E_0 and intensity I_0 is incident on *A* with its electric field vector parallel to the transmission axis. Polariser *B* is then rotated so that its transmission axis makes an angle θ, as shown in the figure above.

Which of the following graphs shows how the intensity of the transmitted light I_t varies with the angle θ?

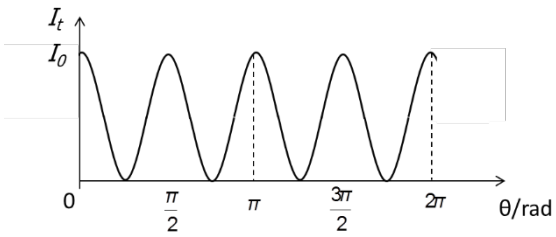
A



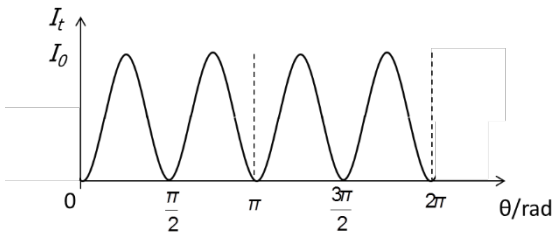
B



C



D



[CJC/Prelims 2014/P1/20]

4 Alice is standing 15 m away from a speaker listening to a music broadcast. Due to a technical fault, the power of the speaker is suddenly reduced by 25%.

How far away from the speaker should Alice stand now in order for the music to be as loud as before? Assume that the speaker is a point source of sound.

A 13 m **B** 11 m **C** 7.5 m **D** 3.8 m

[MJC/Prelims 2014/P1/17]

5 Fig. 8.1 shows the variation with time t of the displacement D_A and D_B at a point X of two sound waves A and B.

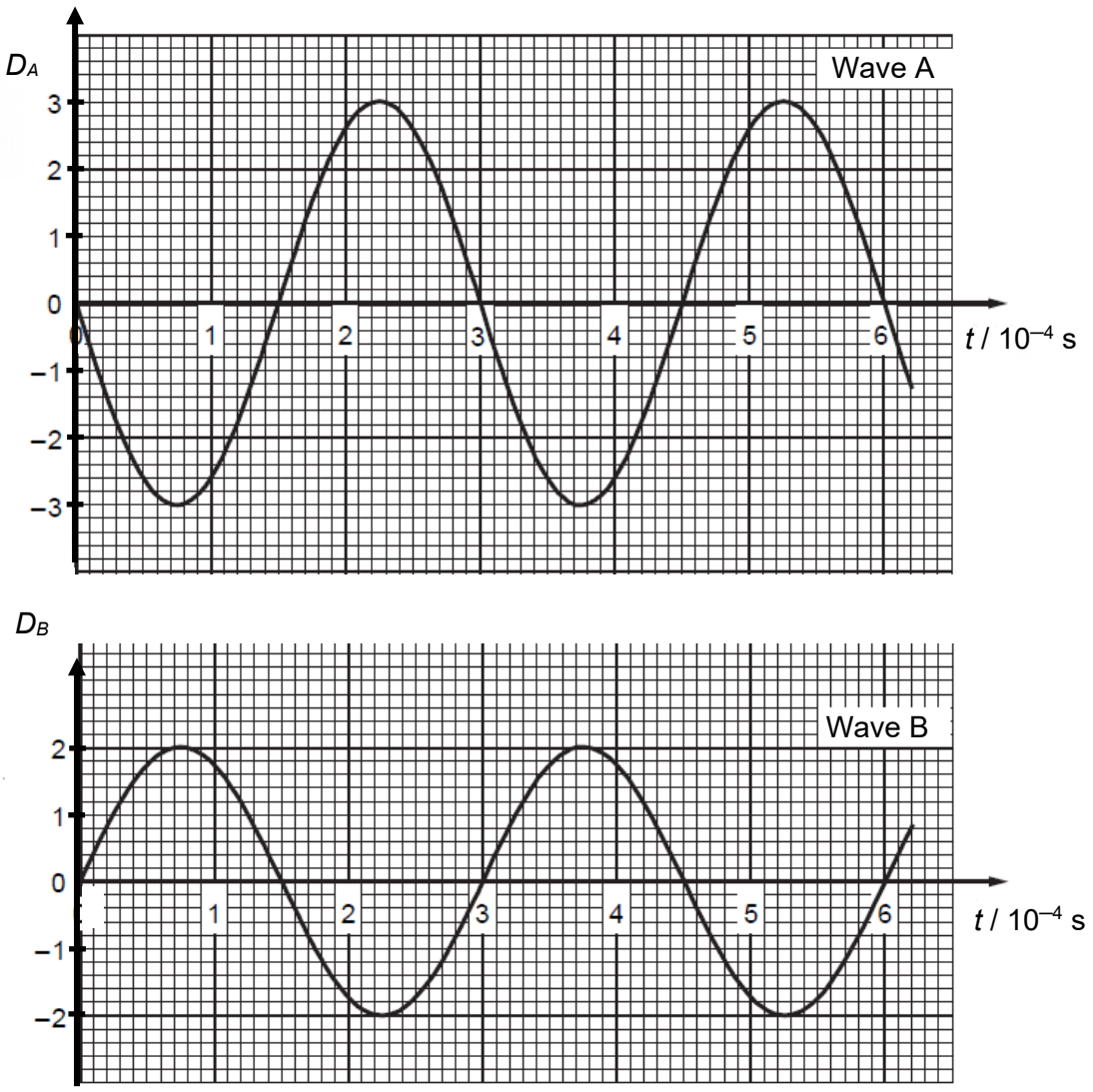


Fig. 8.1

(a) By reference to Fig. 8.1, state one similarity and one difference between these two waves. [2]

(b) State, with a reason, whether the two waves are coherent. [1]

(c) The intensity of wave A alone at point X is I.

(i) Determine the intensity of wave B alone at point X. [2]

(ii) Determine the resultant intensity of the two waves at point X. [2]

[RVHS/Prelims 2014/P3/8 Part]