4.1 Oscillations

Question Paper

Course	DP IB Physics
Section	4. Waves
Topic	4.1 Oscillations
Difficulty	Medium

Time allowed: 20

Score: /10

Percentage: /100



Head to <u>savemyexams.co.uk</u> for more awesome resources

Question 1

 $A\,mass-spring\,system\,is\,oscillating\,with\,simple\,harmonic\,motion.$

What is the total energy of the object proportional to?

- A. The square of both the mass and the amplitude
- B. Mass and displacement of the object
- C. Angular frequency
- D. Mass and the square of the amplitude

[1 mark]

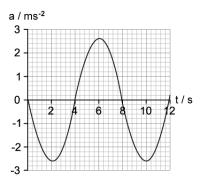
Question 2

Which line identifies quantities which always have opposite directions during simple harmonic motion?

- A. Acceleration and displacement
- B. Acceleration and velocity
- C. Velocity and restoring force
- D. Acceleration and restoring force

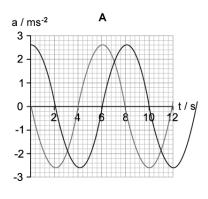
Question 3

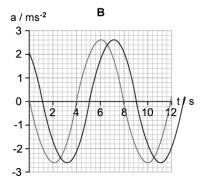
The graph shows the variation with time t of the acceleration a of an object X undergoing simple harmonic motion (SHM).

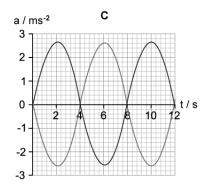


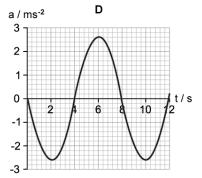
A second object Y oscillates with the same frequency as X but with a phase difference of $\frac{\pi}{4}$.

Which graph shows how the acceleration of object Y varies with t?









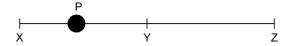


Head to <u>savemy exams.co.uk</u> for more awe some resources

Question 4

A particle, $\bf P$, oscillates on the line $\bf XZ$ about its equilibrium point $\bf Y$, in simple harmonic motion.

At the point shown, which statement could be correct about the motion of the particle?



- A. It has maximum kinetic energy and minimum potential energy
- B. The total energy is equal to the kinetic energy at X
- C. The restoring force is towards **Z** and the particle is accelerating
- D. The restoring force is towards **X** and the particle is accelerating

[1 mark]

Question 5

A pendulum is undergoing simple harmonic motion with a time period T and angular frequency ω .

A student makes a change to the set up so that the pendulum has a new time period 37.

What is the new angular frequency?

- $A.6\omega$
- $B.3\omega$
- C. $\frac{\omega}{3}$
- D. $\frac{\omega}{6}$



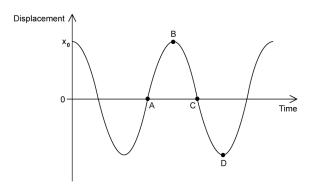
 $Head to \underline{savemyexams.co.uk} for more a we some resources\\$

Question 6

A pendulum is made to swing by a student pulling the bob to the left and releasing it. The student is careful to displace the bob by only a small amount.

After two full oscillations, the motion of the pendulum is plotted on a graph.

At which point is the velocity of the bob towards the right?



[1 mark]

Question 7

A mass is attached to a vertical spring and allowed to reach equilibrium. It is then displaced by a distance d and released. The total energy and time period are E_T and T respectively.

In a second investigation the same mass-spring system travels twice as fast.

Which line correctly identifies the total energy and time period of the second oscillations?

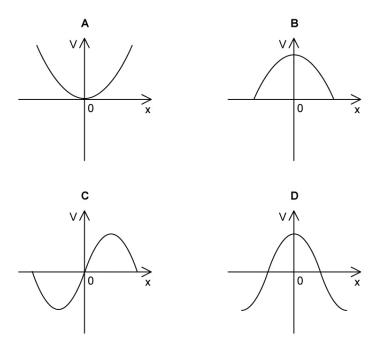
	E _T	Т
A.	2E	$\frac{T}{2}$
В.	4E	$\frac{T}{2}$
C.	2E	2T
D.	4E	Т



 $Head to \underline{savemy exams.co.uk} for more awe some resources\\$

Question 8

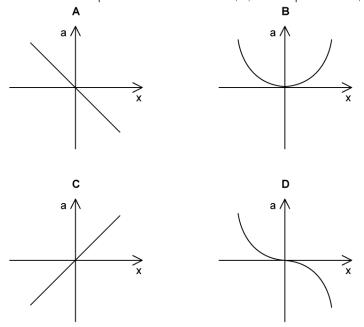
Which of the following graphs shows the variation with displacement x of the speed v of a particle performing simple harmonic motion?



[1 mark]

Question 9

Which graph correctly represents the relationship between acceleration, a, and displacement, x, in simple harmonic motion?

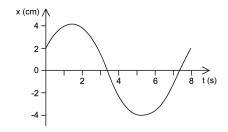


Page 6 of 7

[1 mark]

Question 10

The graph shows the motion of an oscillating body.



What is the frequency of the oscillation?

A.
$$\frac{1}{3.5}$$
 Hz

$$C.\,\frac{1}{7.5}\,Hz$$