

# 4.1 Oscillations

## Question Paper

Course	DPIB Physics
Section	4. Waves
Topic	4.1 Oscillations
Difficulty	Easy

**Time allowed:** 20  
**Score:** /10  
**Percentage:** /100

### Question 1

Identify the incorrect statement about the displacement of an object oscillating in simple harmonic motion.

- A. Displacement is a vector quantity
- B. Displacement and velocity act in opposite directions
- C. Displacement is proportional to the restoring force
- D. Displacement is proportional to acceleration

[1 mark]

### Question 2

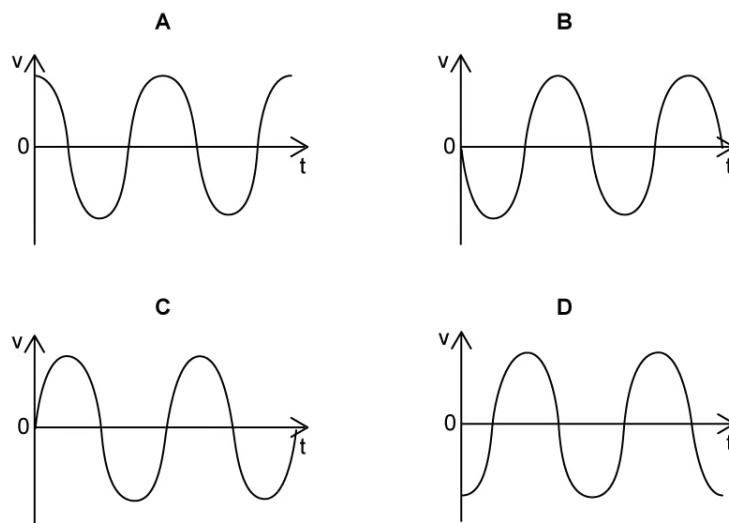
Identify the true statement about phase difference.

- A. Phase difference must be calculated from the crest of one wave to the crest on another wave
- B. When the same points on two different waves align, the waves are in anti-phase
- C. Phase difference is a measure of how much one point on a wave is in front or behind a different point on another wave
- D. Waves in phase have a phase difference of  $2\pi$  radians

[1 mark]

### Question 3

Select the graph that shows the oscillation beginning at positive amplitude  $x_0$ .



[1 mark]

### Question 4

The total energy  $E_T$  in system in simple harmonic motion reflects the energy transfers between the kinetic energy  $E_K$  store and the potential energy  $E_P$  store.

Identify the correct equation for the total energy of a system in simple harmonic motion.

A.  $E_T = E_P - E_K$

B.  $E_T = E_P \times E_K$

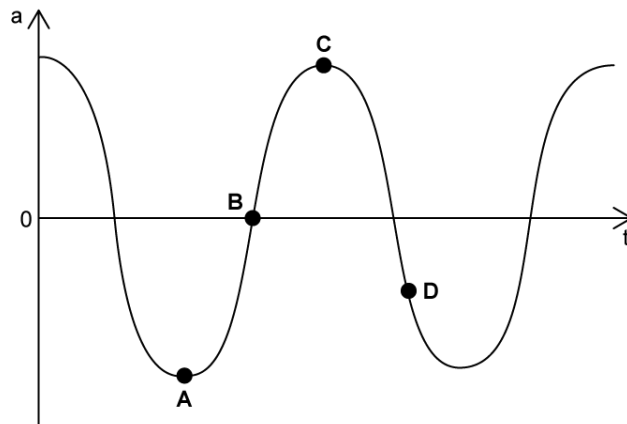
C.  $E_T = \frac{E_K}{E_P}$

D.  $E_T = E_P + E_K$

[1 mark]

### Question 5

Select the position on the acceleration-time graph where displacement  $x = 0$



[1 mark]

### Question 6

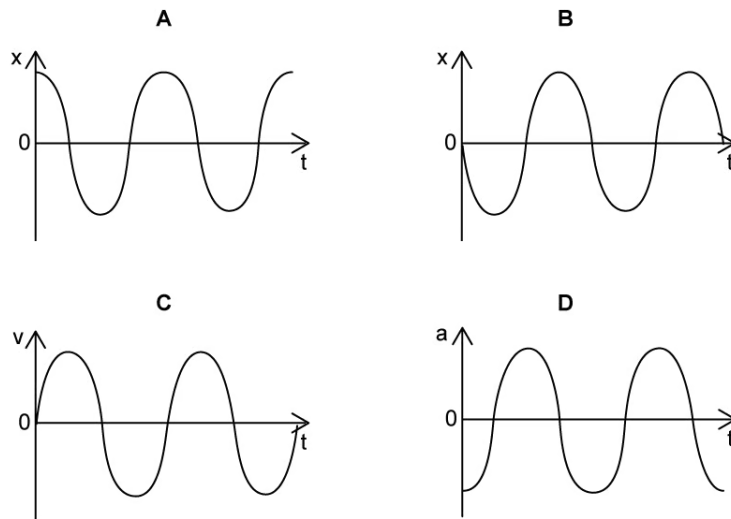
Identify the statement that is not a condition of simple harmonic motion.

- A. The restoring force is directed toward the amplitude  $x_0$
- B. Acceleration is directed toward the equilibrium position
- C. The oscillations are isochronous
- D. The magnitude of the restoring force is proportional to the displacement

[1 mark]

### Question 7

Choose the graph that shows an oscillation beginning at equilibrium.



[1 mark]

### Question 8

Identify the correct equation for time period  $T$  with respect to frequency  $f$ .

A.  $T = \frac{1}{2} \pi f$

B.  $T = \frac{1}{f}$

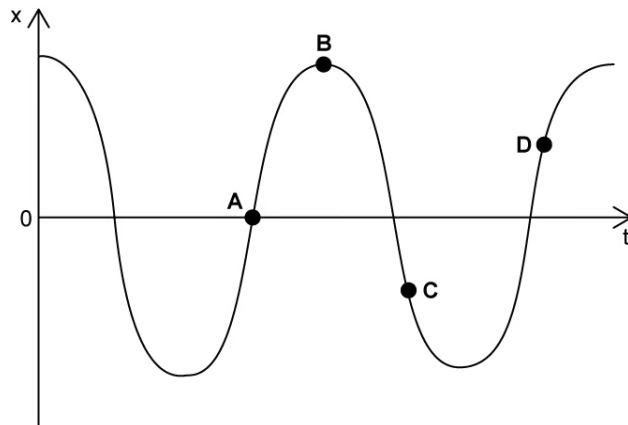
C.  $T = \frac{1}{2} f$

D.  $T = f$

[1 mark]

### Question 9

Select the position on the displacement-time graph that shows when the velocity is zero.



[1 mark]

**Question 10**

As a mass-spring system oscillates in simple harmonic motion, the restoring force  $F$  is proportional to the displacement  $x$ .

$$F = -kx$$

Choose the line that shows the correct units for each quantity.

	<b>Force <math>F</math></b>	<b>Spring constant <math>k</math></b>	<b>Displacement <math>x</math></b>
<b>A.</b>	N	$\text{N m}^{-1}$	m
<b>B.</b>	Nm	N	$\text{m}^2$
<b>C.</b>	$\text{N m}^{-1}$	Nm	ml
<b>D.</b>	N	$\text{N kg}^{-1}$	m

[1 mark]