FREE REVISION PACK

Simple Harmonic Motion

Pearson Edexcel International Advanced Level Physics · Unit 5 (WPH15) · Specification points 143–147

Easy | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Displacement from an acceleration–time graph in SHM	Edexcel IAL January 2021 · Unit 5 · Q9	1 mark
2	Easy	Direction of acceleration in SHM	Edexcel IAL January 2024 · Unit 5 · Q4	1 mark
3	Easy	Maximum velocity in SHM	Edexcel IAL January 2023 · Unit 5 · Q9	1 mark
4	Easy	A correct statement about SHM	Edexcel IAL January 2022 · Unit 5 · Q1	1 mark
5	Easy	Amplitude from maximum velocity	Edexcel IAL January 2024 · Unit 5 · Q7	1 mark

Key ideas to have ready

- SHM: $a = -\omega^2 x$: acceleration ∝ displacement and towards the equilibrium position.
- $\omega = 2\pi/T = 2\pi f$; $v_{max} = \omega A$; $a_{max} = \omega^2 A$.
- Velocity is ¼ cycle ahead of displacement; acceleration is in antiphase with displacement.
- Velocity is maximum at $x = 0$; acceleration is maximum at the extremes.

How to use this pack

1. The questions are grouped into levels (Easy). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in Pearson's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

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Easy

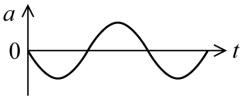
Definitions and one-step ideas. Most students get these right.

Questions 1–5

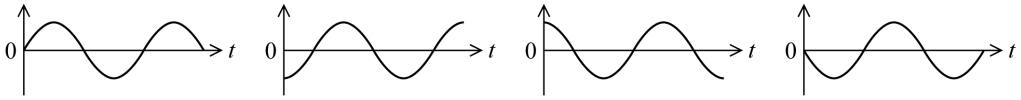
Choose **one** answer for each question and put a cross in the box next to it.

Edexcel IAL January 2021 · Unit 5 · Q9

1 The graph shows how the acceleration a varies with time t for an object performing simple harmonic motion.



Four graphs of a quantity plotted against t are shown below. The scale on the x-axis is the same for each graph.



A **B** **C** **D**

Which graph shows how the displacement of the object varies with t?

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

Edexcel IAL January 2024 · Unit 5 · Q4

2 A mass is oscillating with simple harmonic motion.

Which of the following statements about the acceleration of the mass is correct?

- ☒ **A** The acceleration is always in the opposite direction to the velocity.
- ☒ **B** The acceleration is always in the same direction as the velocity.
- ☒ **C** The acceleration is always away from the equilibrium position.
- ☒ **D** The acceleration is always towards the equilibrium position.

Edexcel IAL January 2023 · Unit 5 · Q9

3 An object oscillates with simple harmonic motion. The period of oscillation is 0.65 s and the amplitude is 0.12 m.

Which of the following expressions gives the maximum velocity of the object?

- ☒ **A** $2\pi \times 0.65 \times 0.12$
- ☒ **B** $\frac{2\pi}{0.65} \times 0.12$
- ☒ **C** $(2\pi \times 0.65)^2 \times 0.12$
- ☒ **D** $\left(\frac{2\pi}{0.65}\right)^2 \times 0.12$

Edexcel IAL January 2022 · Unit 5 · Q1

4 A mass oscillates with simple harmonic motion about a fixed point O.

Which of the following statements about the motion of the mass is correct?

☒ **A** Its velocity is always towards O.

☒ **B** Its acceleration is always towards O.

☒ **C** Its acceleration is directly proportional to its velocity.

☒ **D** Its acceleration and its velocity are always in opposite directions.

Edexcel IAL January 2024 · Unit 5 · Q7

5 A mass oscillates with simple harmonic motion. The mass has an angular velocity of $2\,\text{rad}\,\text{s}^{-1}$ and a maximum velocity of $10\,\text{cm}\,\text{s}^{-1}$.

Which of the following gives the magnitude of the amplitude A of the oscillation in cm?

☒ **A** $A = \frac{2}{10}$

☒ **B** $A = \frac{10}{2}$

☒ **C** $A = \frac{2\sin 2t}{10}$

☒ **D** $A = \frac{10}{2\sin 2t}$

End of questions. Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition:
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