


A Level • OCR • Physics

 8 mins 8 questions

Multiple Choice Questions

Damping

Energy in SHM / Free & Forced Oscillations / Damping / Resonance / Examples of Forced Oscillations & Resonance

Easy (2 questions)	/2
Medium (5 questions)	/5
Hard (1 question)	/1
Total Marks	/8

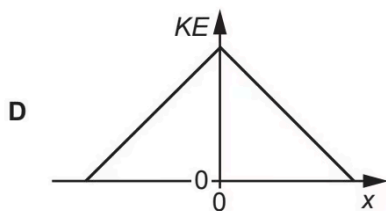
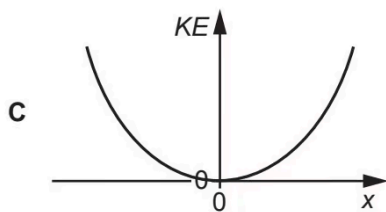
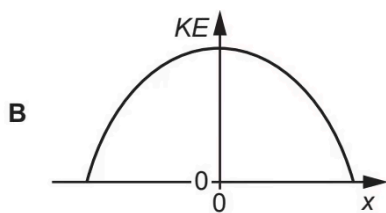
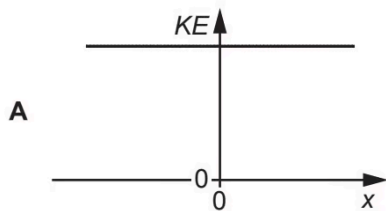
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Easy Questions

- 1 An oscillator is executing simple harmonic motion.

Which graph of kinetic energy KE against displacement x is correct for this oscillator?



(1 mark)

2 Oscillations of an object can either be **free** or **forced**. Which of the following is an example of a **forced** oscillation?

- A.** A ball rolling to-and-fro on a curved track.
- B.** A loudspeaker oscillating and producing a continuous note.
- C.** A mass oscillating from the end of a suspended spring.
- D.** A pendulum bob oscillating from the end of a fixed length of string.

(1 mark)

Medium Questions

1 A pendulum is oscillating in air and experiences damping. Which of the following statements is/are **correct** for the damping force acting on the pendulum?

1 It is always opposite in direction to acceleration. 2 It is always opposite in direction to velocity. 3 It is maximum when the displacement is zero.

A. Only 1 and 2

B. Only 2 and 3

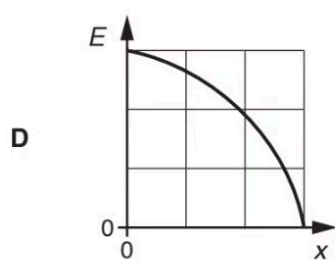
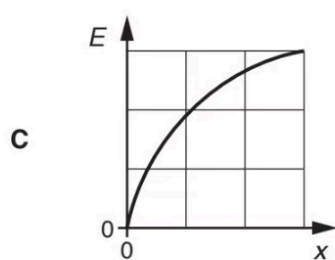
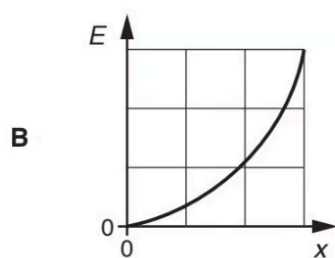
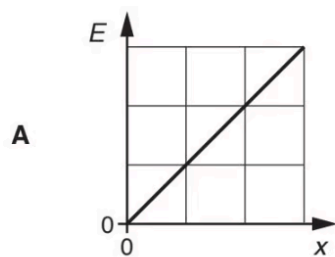
C. Only 3

D. 1, 2 and 3

(1 mark)

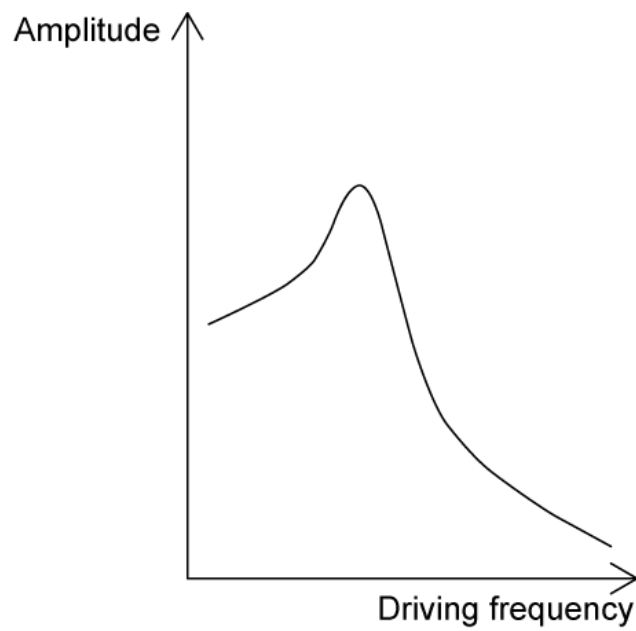
2 An object oscillates with simple harmonic motion. Which graph **best** shows the variation

of its potential energy E with distance x from the equilibrium position?



(1 mark)

3 A graph of amplitude against driving frequency is shown for a forced oscillator.



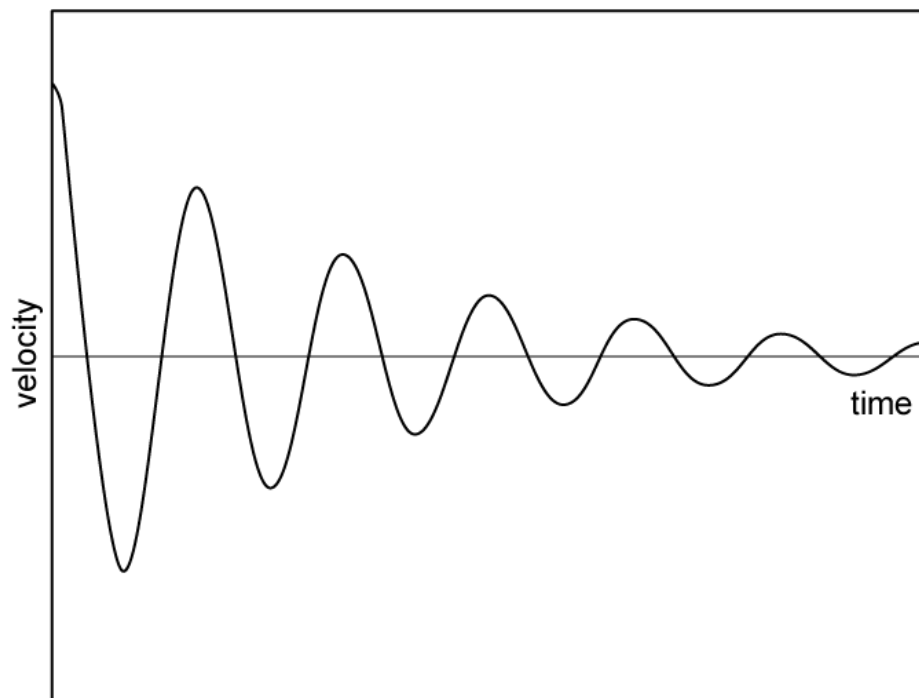
Which of the following statements are true after damping is **increased**?

1. The maximum amplitude for the oscillator will occur at a higher driving frequency
2. The peak on the graph will be flatter (less sharp)
3. The amplitude at twice the natural frequency of the oscillator will be reduced.
4. The natural frequency of the oscillator will be decreased

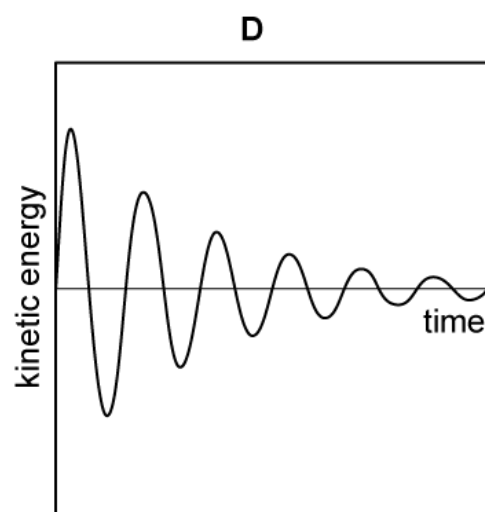
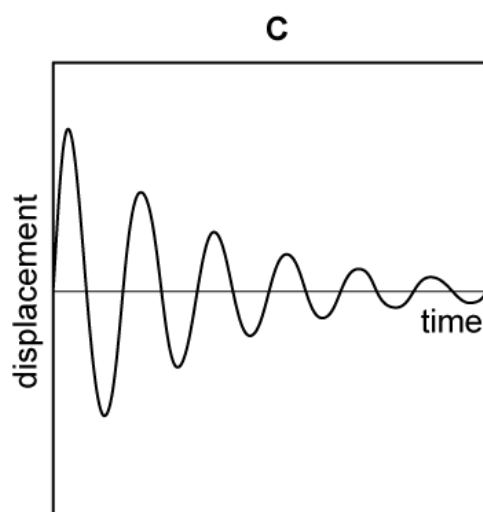
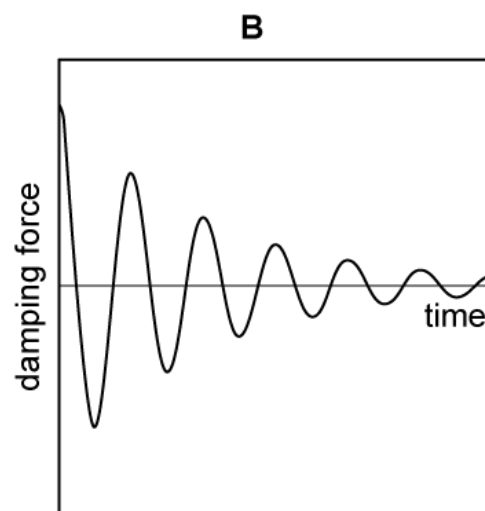
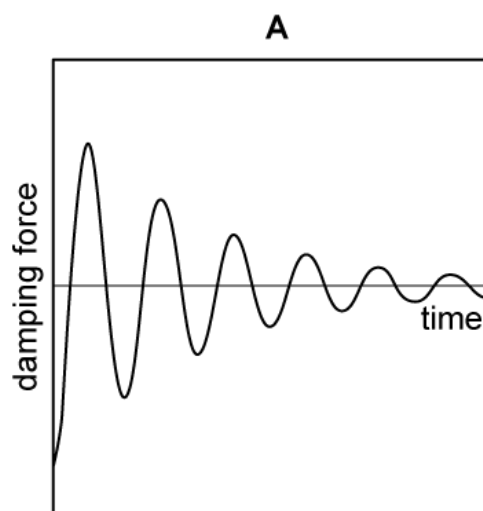
- A.** Only 1 and 2
B. Only 2 and 3
C. Only 3 and 4
D. 1, 2, 3 and 4

(1 mark)

4 The velocity versus time graph for a damped oscillator is shown.



Which of the following graphs is correct, given the velocity versus time graph above?

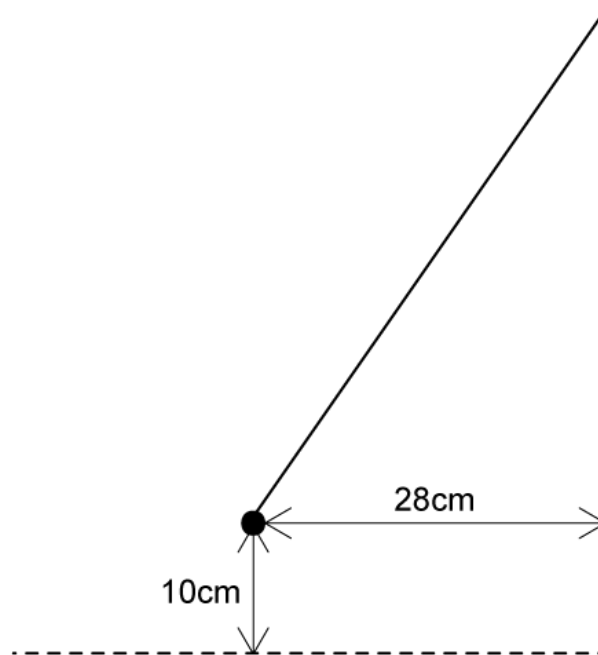


- A.** Only 1 and 3
- B.** Only 1 and 4
- C.** Only 2 and 3
- D.** Only 2 and 4

(1 mark)

- 5** A pendulum bob on the end of a string is displaced horizontally by a distance of 28 cm from the midline, which raises its height to 10 cm above the lowest point of the

pendulum swing. Assuming the system will oscillate with simple harmonic motion, what is the angular frequency of the pendulum bob when it is released?



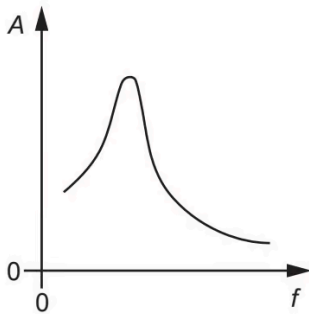
- A.** 0.5 rad s^{-1}
- B.** 1 rad s^{-1}
- C.** 5 rad s^{-1}
- D.** 10 rad s^{-1}

(1 mark)

Hard Questions

- 1 An oscillator is forced to oscillate at different frequencies.

The graph of amplitude A against driving frequency f for this oscillator is shown.



The damping on the oscillator is now **decreased**.

Which of the following statements is/are correct?

- 1 The amplitude of the oscillations at any frequency decreases. 2 The maximum amplitude occurs at a lower frequency. 3 The peak on the graph becomes thinner.

- A.** Only 1
B. Only 2
C. Only 3
D. 1, 2 and 3

(1 mark)