

- 1 A child's toy consists of a wooden bee attached to a spring. The toy is hung from a support and the bee is displaced vertically 7.5 cm from its equilibrium position and released.



After oscillating for 1 minute the amplitude has become 2.5 cm.

The ratio of the total energy of oscillation at the start to the total energy of oscillation after 1 minute is

- A 1/9
- B 1/3
- C 3
- D 9

(Total for Question = 1 mark)

- 2 A guitar string is plucked and set into oscillation. Over time the amplitude of oscillation of the string decreases.

The oscillation of the string is said to be

- A damped.
- B forced.
- C natural.
- D resonant.

(Total for Question = 1 mark)

- 3 The Millennium Bridge is a pedestrian suspension bridge across the River Thames in London. The bridge had to be closed soon after its opening because of a large swaying motion created by people walking across it. A damping mechanism was installed to fix the problem.

The damping mechanism

- A increased the stiffness of the bridge.
- B increased the natural frequency of the bridge.
- C dissipated energy from the bridge.
- D decreased the forcing frequency on the bridge.

(Total for Question = 1 mark)

- 4 A very long pendulum set into oscillation continues to swing for several hours. During this time, as a result of the Earth's rotation, the pendulum will appear to change its direction of swing.

The movement of this pendulum is an example of

- A critical oscillation.
- B forced oscillation.
- C free oscillation.
- D resonant oscillation.

(Total for Question = 1 mark)

- 5 The damping force acting on an oscillating system is always

- A in the opposite direction to the acceleration.
- B in the opposite direction to the velocity.
- C in the same direction as the acceleration.
- D in the same direction as the velocity.

(Total for Question = 1 mark)

6 Which of the following descriptions **cannot** apply to the oscillations of a system undergoing resonance?

- A Damped
- B Driven
- C Forced
- D Free

(Total for Question = 1 mark)

7 When a forced oscillation is damped, the amplitude

- A builds up quite slowly.
- B constantly rises and falls.
- C is always small.
- D is reduced.

(Total for Question = 1 mark)

8 If an oscillating system is completely undamped, the system

- A exhibits simple harmonic motion.
- B is said to be a free oscillation.
- C obeys Hooke's law.
- D oscillates indefinitely.

(Total for Question = 1 mark)

- 9 A car is travelling over a rough road surface. At low speed the ride is very bumpy with the car and its occupants suffering large amplitude vertical oscillations. However, when the car is driven at a higher speed the ride gets smoother.

This is because at the higher speed

- A the car leaves the ground and misses the bumps.
- B the car crushes the bumps and makes the road smoother.
- C there is a greater amount of damping in the car's suspension.
- D the car's suspension oscillates at a greater frequency than its natural frequency.

(Total for Question = 1 mark)