

APOLLO

Simple harmonic motion

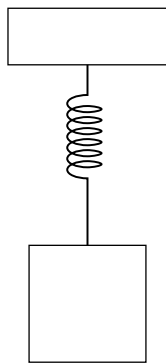
SL

Physics

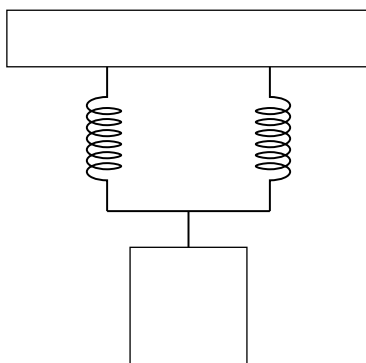
First assessment 2025

8 questions | questions

13. A mass–spring system oscillates with time period T_1 .



Another identical spring is connected in parallel with the first spring as shown. The mass is unchanged.



The time period of the oscillation for the two-spring system is T_2 .

What is $\frac{T_2}{T_1}$?

- A. $\frac{1}{2}$
- B. $\frac{1}{\sqrt{2}}$
- C. $\sqrt{2}$
- D. 2

— 3 —

4425-0110

11. A pendulum of length L oscillates with an angular frequency ω . The mass of the pendulum is doubled and its length is changed to $\frac{L}{4}$.

What is the new angular frequency of the pendulum?

- A. $\frac{\omega}{2}$
- B. ω
- C. 2ω
- D. $2\sqrt{2}\omega$

15. For a lightly damped oscillation...

- A. the amplitude goes to zero within one period of oscillation.
- B. the oscillation frequency does not change with time.
- C. energy is transferred from the oscillation as quickly as possible.
- D. the oscillation frequency equals the undamped oscillation frequency.

— 3 —

2225-0710

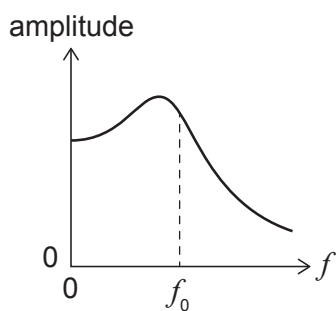
- 13.** A simple pendulum oscillates with period T on Earth. The mass of the pendulum is doubled and oscillates on the Moon where the acceleration due to gravity is $\frac{1}{6}$ that of Earth. The length of the pendulum stays the same.

What is the period of the pendulum on the Moon?

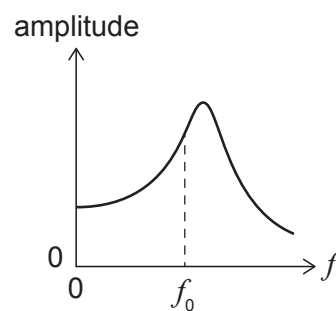
- A. $\sqrt{12} T$
- B. $\sqrt{6} T$
- C. $\sqrt{3} T$
- D. $\sqrt{2} T$

16. A heavily damped oscillator of natural frequency f_0 is driven by a periodic force of frequency f . Which graph shows how the amplitude of the oscillations varies with f ?

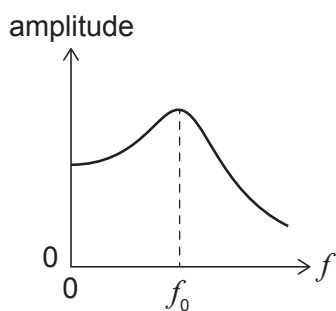
A.



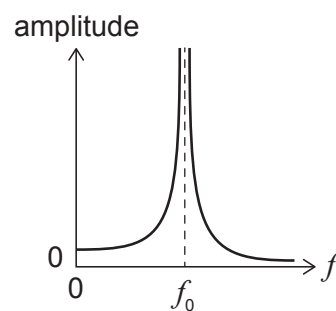
B.



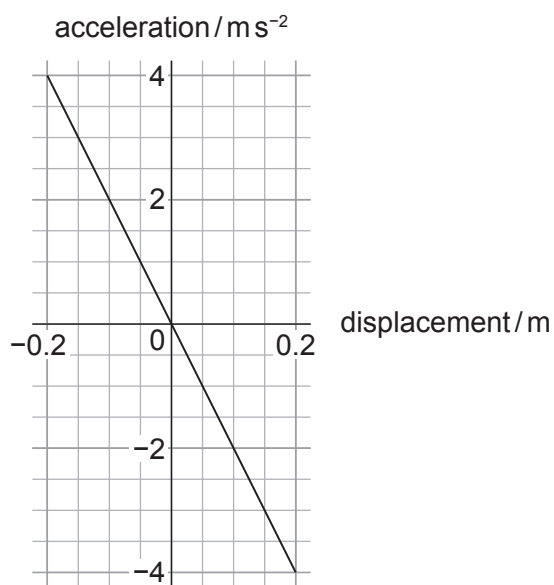
C.



D.



12. An object undergoes simple harmonic motion with frequency f . The graph shows the variation of its acceleration with displacement.



What is the value of f^2 in s^{-2} ?

- A. $\frac{5}{\pi^2}$
- B. $\frac{5}{\pi}$
- C. $\frac{100}{\pi^2}$
- D. $\frac{100}{\pi}$

14. A particle undergoes simple harmonic motion of period T . At time $t = 0$ the particle is at its equilibrium position.

What is t when the particle is at its greatest distance from the equilibrium position?

- A. $\frac{T}{8}$
- B. $\frac{T}{2}$
- C. $\frac{3T}{4}$
- D. T

— 3 —

0000—0004

- 16.** A mass of 0.25 kg hangs from a spring of spring constant 4.0 N m^{-1} .

What is the natural frequency of oscillation for this system?

- A. 0.50 Hz
- B. 0.64 Hz
- C. 1.6 Hz
- D. 2.0 Hz