2 5 A mass of 0.90 kg is suspended from the lower end of a light spring of stiffness 80 N m^{-1}.

When the mass is displaced vertically and released, it undergoes vertical oscillations of small amplitude.

What is the frequency of the oscillations?

[1 mark]

A 0.071 Hz   ⬭

B 0.67 Hz   ⬭

C 1.50 Hz   ⬭

D 14 Hz   ⬭

Do not write outside the box

ₖ]

| 3 | 0 | The period of a simple pendulum is doubled when the pendulum length is increased by 1.8 m.

What is the original length of the pendulum?

[1 mark]

A 0.45 m ⬭

B 0.60 m ⬭

C 0.90 m ⬭

D 3.6 m ⬭

25

END OF QUESTIONS

2 8 An object of mass m moves in a circle of radius r. It completes n revolutions every second.

What is the kinetic energy of the object?

[1 mark]

A $\dfrac{mn^2r^2}{8\pi^2}$

B $\dfrac{mn^2r^2}{4\pi^2}$
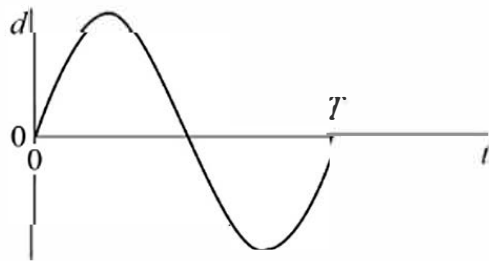
C $2m\pi^2n^2r^2$

D $4m\pi^2n^2r^2$

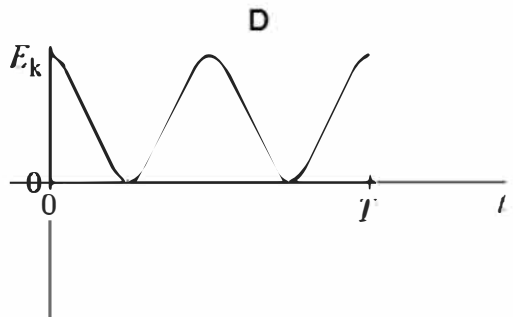**Turn over for the next question**
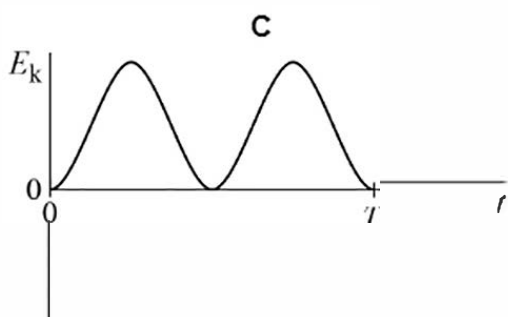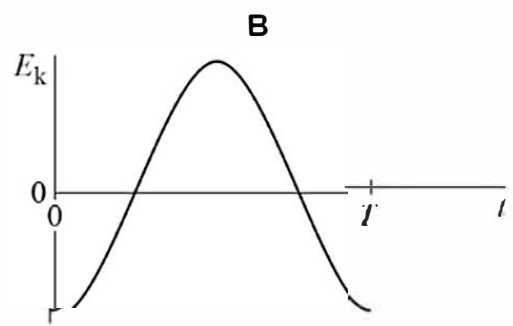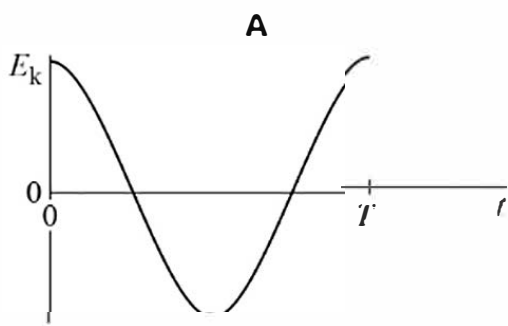
Turn over ▶

2 9 The graph shows the variation of displacement d with time t for a particle moving with simple harmonic motion of period T.

Which graph shows the variation of kinetic energy E_k of the particle with time?

[1 mark]

A

B

C

D

A ⬭

B ⬭

C ⬭

D ⬭

3 0 Two pendulums **A** and **B** oscillate with simple harmonic motion.
The time period of **A** is 2.00 s and the time period of **B** is 1.98 s.

A and **B** are released in phase.

What is the number of oscillations of **A** before **A** and **B** are next in phase?

[1 mark]

A 49　　　　　　　　　　◯

B 50　　　　　　　　　　◯

C 99　　　　　　　　　　◯

D 100　　　　　　　　　◯

3 1 The frequency of oscillation of a vertical spring is f when the mass hanging from the spring
is m.

What is the relationship between f and m?

[1 mark]

A $f \propto m^{-\frac{1}{2}}$　　　　　◯

B $f \propto m^{-2}$　　　　　◯

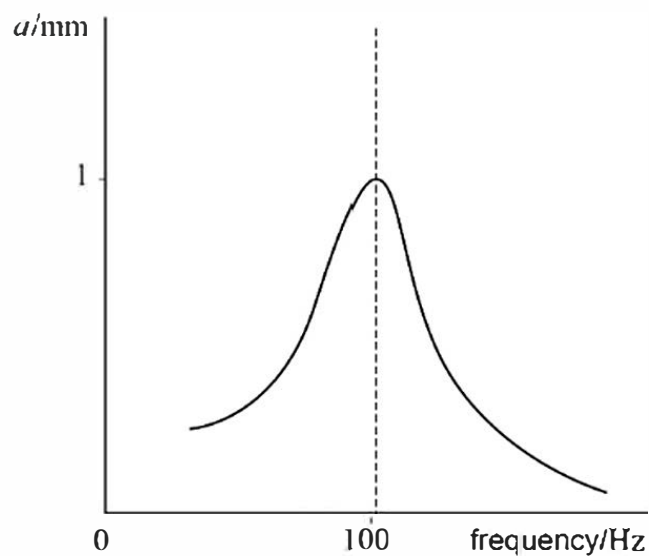**C** $f \propto m^{\frac{1}{2}}$　　　　　◯

D $f \propto m^{2}$　　　　　◯

Turn over for the next question

3 2 A metal panel is driven to vibrate at different frequencies. The amplitude a of the vibration is measured at each frequency. The graph shows the variation of amplitude with driven frequency.
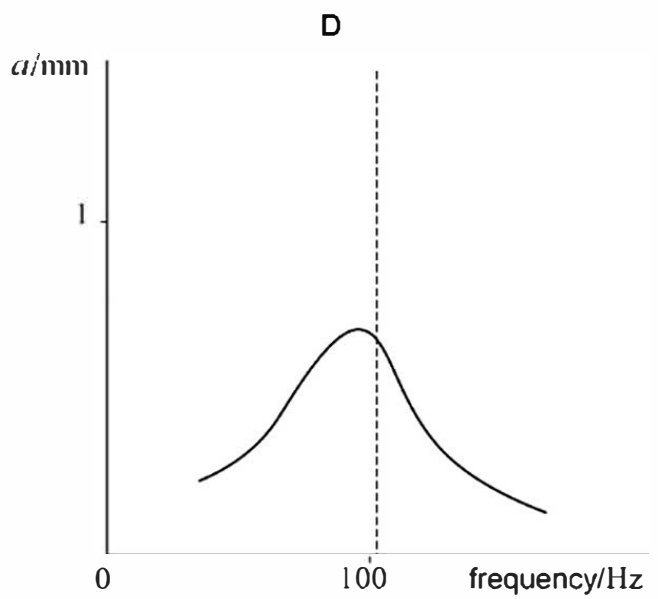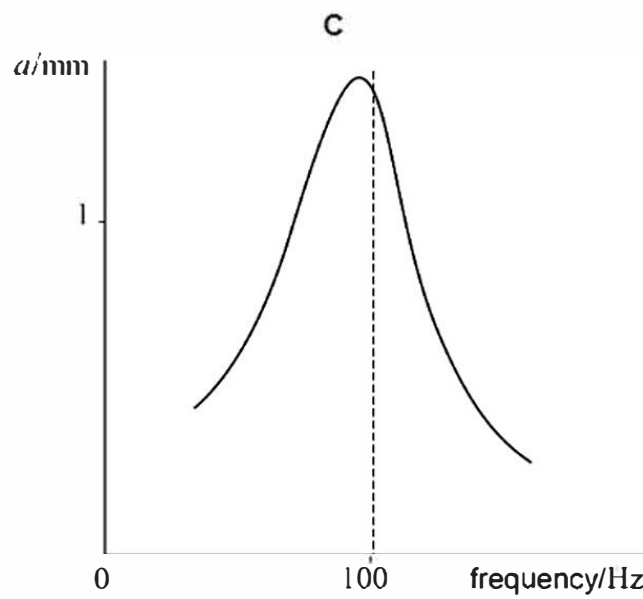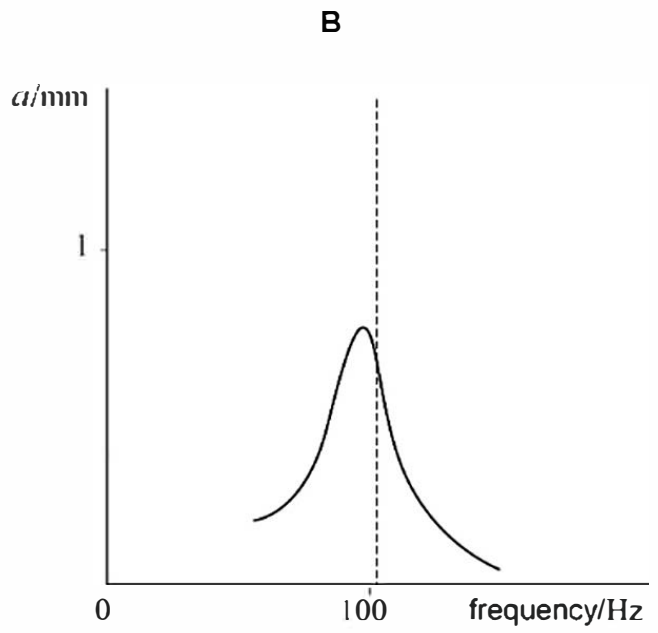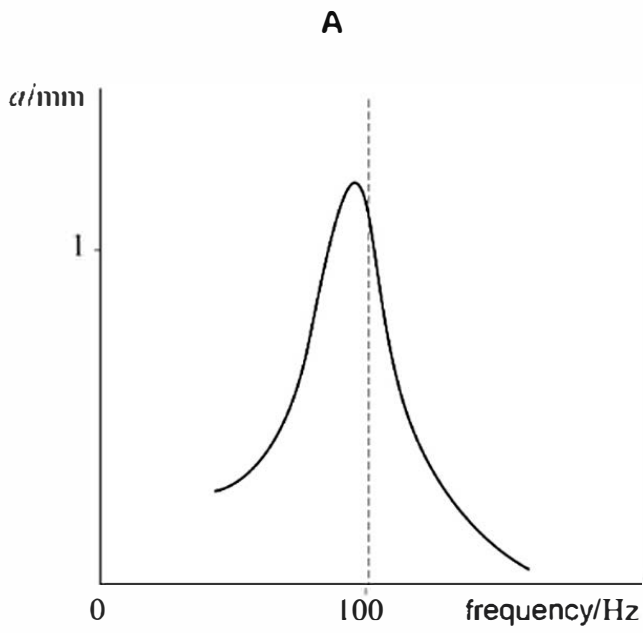

The damping of the metal panel is increased without changing the mass of the panel.

Which graph on the opposite page shows the variation of a with frequency with increased damping?

[1 mark]

A

B

C

D

A ⬭

B ⬭

C ⬭

D ⬭

END OF QUESTIONS