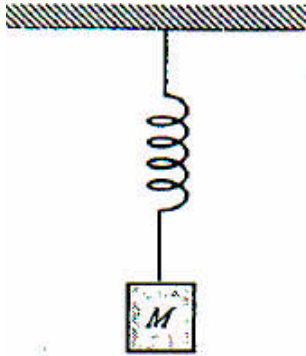


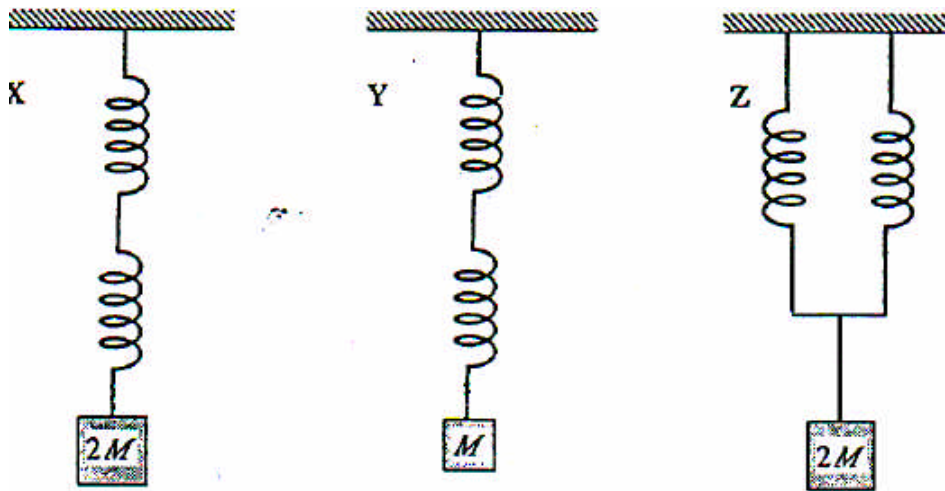
Chapter 10

Multiple choice and quick questions

1. The first mass spring system shown below has a period of T when the mass oscillates vertically.



The spring systems below use identical springs to the system above.



Which of the statements below is/are correct?

- 1: System X has a time period of $2T$.
- 2: System Y has a time period of $2T$.
- 3: System Z has a time period of $2T$.

- A** 1 only **B** 2 only **C** 1 and 3 only **D** 2 and 3 only
E 1, 2 and 3

2. This question is about a simple pendulum performing simple harmonic oscillations (Fig. 1)

The graph (Fig. 2) shows the period T of a simple pendulum varies with its length l .

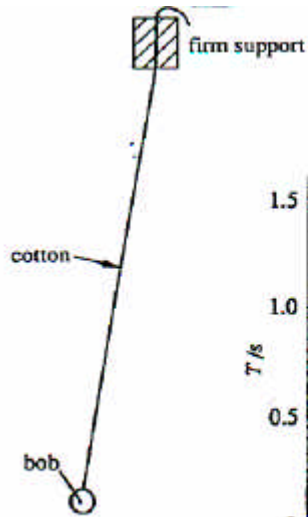


Fig. 1

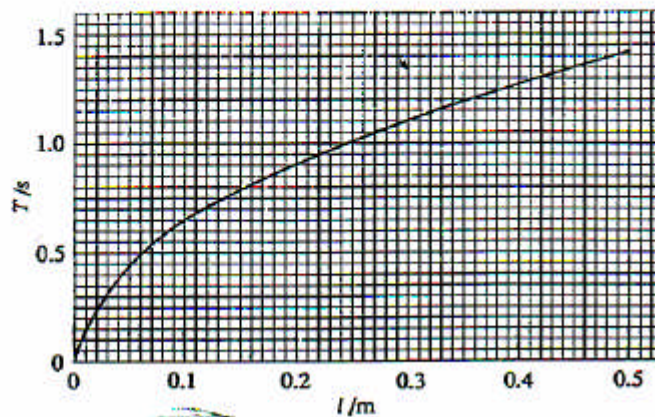


Fig. 2

A student claims that the graph shows that:

$$T = k\sqrt{l}$$

Take measurements from the graph to:

- (i) check this claim by calculation;

- (ii) find the length of the pendulum which has a period of 1.60 s.

3. Which of the following is/are simple harmonic oscillations to a good approximation?

- 1: a heavy bar swinging gently from a pivot near one end
- 2: a molecule rebounding to and fro inside a box
- 3: a mass moving gently up and down on the end of a spring

- A** 1 only **B** 2 only **C** 1 and 3 only **D** 2 and 3 only
E 1, 2 and 3

4. Which of the following is/are exponential in form?

- 1: The variation of electric field strength with distance from the centre of a charged sphere.
 2: The variation of the activity of a radioactive source with time.
 3: The variation of the intensity of light with distance from a star.

- A** 1 only **B** 2 only **C** 1 and 3 only **D** 2 and 3 only
E 1, 2 and 3

5. An experimenter records the value of a current I in a thermistor at various temperatures T . The experimenter wishes to test the relationship:

$$I \propto P e^{-A/T} \text{ where } A \text{ and } P \text{ are constants.}$$

If the relationship is correct, which quantities should be plotted to obtain a straight line?

- A** I against $1/T$
B $1/I$ against $1/T$
C I against $\ln T$
D $\ln I$ against T
E $\ln I$ against $1/T$

6. A crane carries a load which swings with a natural frequency f . With suspension of length l , the period T of the motion is:

$$2\pi \sqrt{l/g}$$

The load is lifted until the suspension is half its original length. Which one of A to E below gives the frequency of the oscillating load?

- A** f **B** $2f$ **C** $f/2$ **D** $f\sqrt{2}$ **E** $f/\sqrt{2}$

7. Which one of **A** to **E** below gives the frequency when the suspension is its original length but the load is doubled?

- A** f **B** $2f$ **C** $f/2$ **D** $f\sqrt{2}$ **E** $f/\sqrt{2}$

8. This question is about the oscillation observed when a student stands on bathroom scales.

The pointer on the scale oscillates before reaching a steady reading, as shown in fig.4.

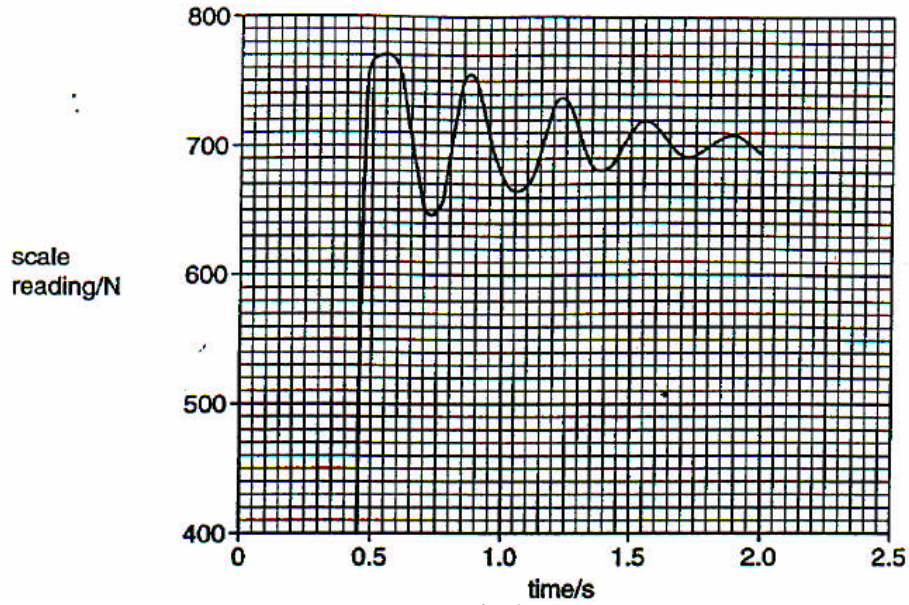


Fig.4

- (a) The student comments that the oscillation appears to be harmonic. What evidence from the graph supports this statement?

- (b) Use the information on the graph to determine

the mass of the student:

$$g = 9.8 \text{ N kg}^{-1}$$

the frequency of the oscillation: