

In this experiment, you will investigate the oscillations of a pendulum on a board.

- (a) • Fix the string of the pendulum onto the nail using some of the adhesive putty, as shown in Fig. 1.1.

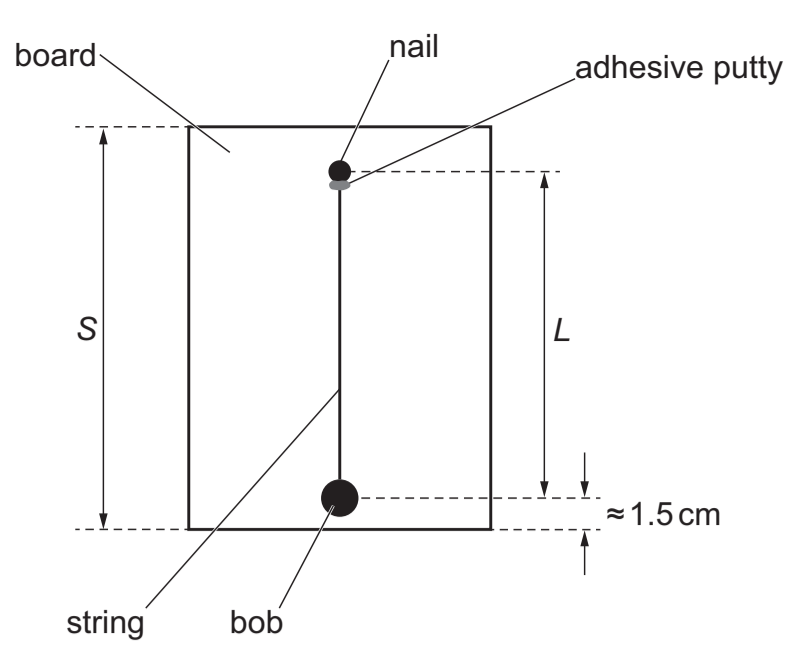


Fig. 1.1

- The distance between the two edges of the board is  $S$ , as shown in Fig. 1.1.

The length  $L$  of the pendulum is the distance between the centre of the nail and the centre of the bob.

Adjust the length of the pendulum by wrapping the string around the nail so that the centre of the bob is approximately 1.5 cm from the edge of the board.

- Measure and record  $S$  and  $L$ .

$S = \dots\dots\dots$  cm

$L = \dots\dots\dots$  cm [1]

- (b) • Set up the apparatus as shown in Fig. 1.2.

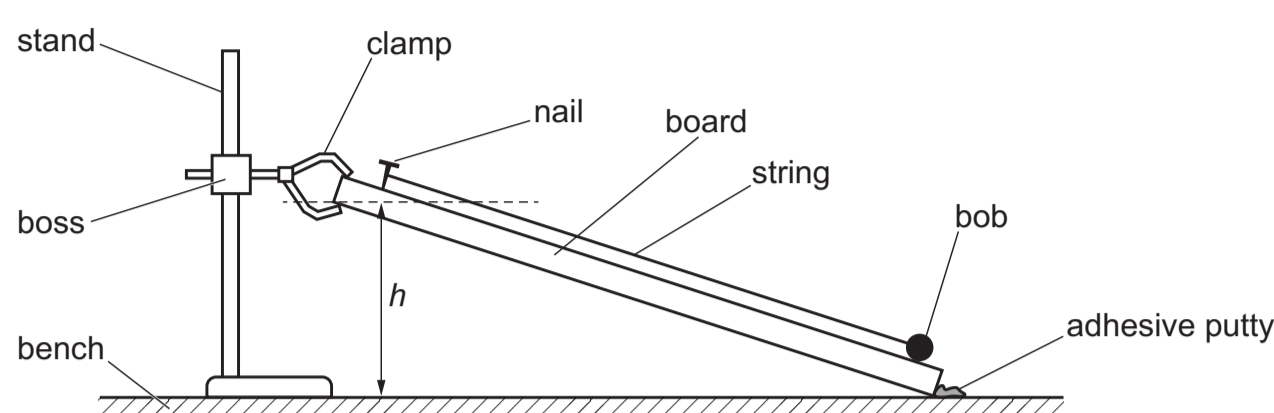


Fig. 1.2

- The distance between the lower edge of the top of the board and the bench is  $h$ , as shown in Fig. 1.2.

Adjust the position of the boss so that  $h$  is approximately 22 cm.

- Fix the position of the bottom of the board using adhesive putty.

- Measure and record  $h$ .

$h = \dots\dots\dots$  cm

- Move the bob to the edge of the board, as shown in Fig. 1.3.

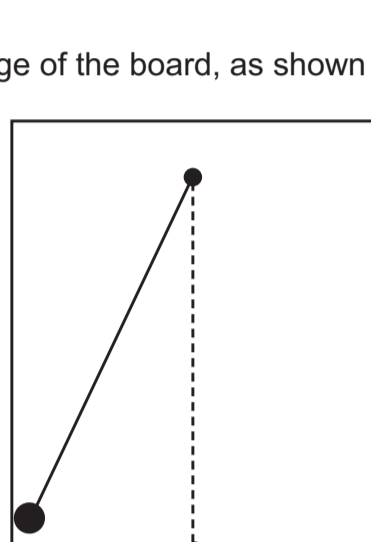


Fig. 1.3

- Release the bob. The bob rolls across the board and the pendulum oscillates.

- Take measurements to determine the period  $T$  of the oscillations.

$T = \dots\dots\dots$  s [2]

- (c) Change  $h$  in the range  $10.0\text{ cm} \leq h \leq 38.0\text{ cm}$  and determine  $T$ . Repeat until you have six sets of values of  $h$  and  $T$ .

Record your results in a table. Include values of  $\frac{S}{h}$  and  $T^2$  in your table.

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- (e) (i) It is suggested that the quantities  $T$ ,  $S$  and  $h$  are related by the equation

$$T^2 = A \frac{S}{h} + B$$

where  $A$  and  $B$  are constants.

Using your answers in (d)(iii), determine the values of  $A$  and  $B$ . Give appropriate units.

$A = \dots\dots\dots$

$B = \dots\dots\dots$  [2]

- (ii) Theory suggests that

$$A = \frac{28\pi^2 L}{5g}$$

where  $g$  is the acceleration of free fall.

Use your values in (a) and (e)(i) to determine a value for  $g$ . Give an appropriate unit.

$g = \dots\dots\dots$  [1]

[Total: 20]

You may not need to use all of the materials provided.