

1 An IGCSE student is investigating the stretching of springs.
 Fig. 1.1 shows the apparatus used for the first part of the experiment.

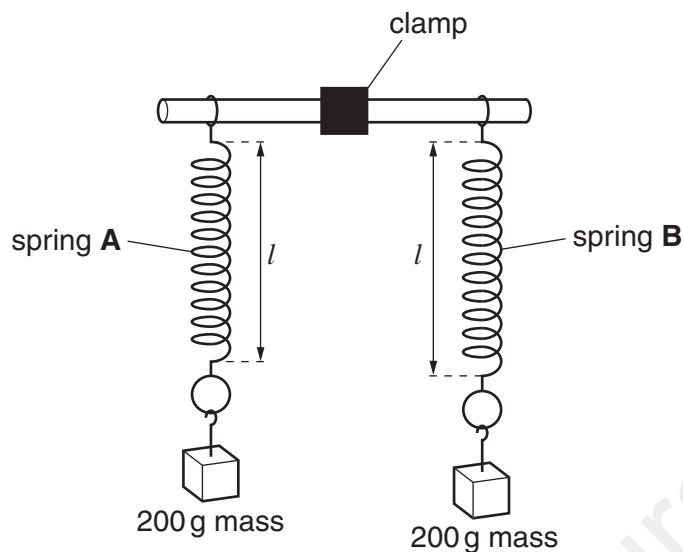


Fig. 1.1

The unstretched length l_A of spring **A** is 15 mm.

The unstretched length l_B of spring **B** is 16 mm.

(a) The student hangs a 200 g mass on each spring, as shown in Fig. 1.1.

(i) On Fig. 1.1 measure the new length l of spring **A**.

$l = \dots\dots\dots$ mm

(ii) Calculate the extension e_A of the spring using the equation $e_A = (l - l_A)$.

$e_A = \dots\dots\dots$ mm

(iii) On Fig. 1.1 measure the new length l of spring **B**.

$l = \dots\dots\dots$ mm

(iv) Calculate the extension e_B of the spring using the equation $e_B = (l - l_B)$.

$e_B = \dots\dots\dots$ mm
 [2]

- (b) Explain why the student takes the time for ten swings and then calculates the time for one swing, rather than just measuring the time for one swing.

.....
.....[1]

- (c) The student tries to find a relationship between T and d . She first suggests that $T \times d$ is a constant.

- (i) Calculate the values of $T \times d$ and enter the values in the final column of the table.
- (ii) State whether or not the results support this suggestion and give a reason for your answer.

Statement

.....

Reason

.....

[2]

-----Marking Scheme-----

- (a) (i) $l = 29$ (mm) and $l = 31$ (mm) (allow 2.9 cm, 3.1 cm) [1]
 $e_A = 14$ (mm) and $e_B = 15$ (mm) (ecf) (ignore minus signs) [1]
- (b) (i) both l correct to (21.5 – 22) and 24 [1]
(ii) (6.5 – 7) and 8 (ecf) (ignore minus signs) [1]
(iii) $e_{av} = 7.5$ (c.a.o.) [1]
- (c) statement matches readings (expect YES) (ecf NO) [1]
justification matches statement and by reference to results
(expect within limits of experimental accuracy, wtte) (too different, wtte) [1]