

AS Level Physics A
H156/02 Depth in physics

Question Set 2

1. Fig. 2.1 shows an experiment in the laboratory to investigate the extension of two identical springs connected end to end. A student initially measures the length L of the two-spring combination without a load attached.

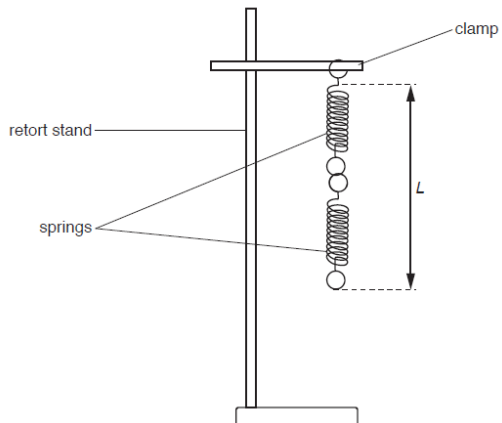


Fig. 2.1

The student adds mass m to the lower spring and measures the new length L of the two-spring combination.

The student determines the weight F of the mass added to the spring.

The student's results are shown in Fig. 2.2.

m/g	F/N	L/cm	
0	0	12.0	
50	0.49	13.0	
100	0.98	13.8	
150	1.47	14.8	2.8
200	1.96	15.6	3.6
250	2.45	16.6	4.6

Fig. 2.2

- (a) Complete the table shown in Fig. 2.2 by calculating and recording values of the extension e/cm of the spring combination.

(b) On Fig. 2.3 plot a graph of e/cm (y -axis) against F/N (x -axis). Draw the straight line of best fit.

[4]

(c) Determine the gradient of the straight line of best fit.

gradient =

[1]

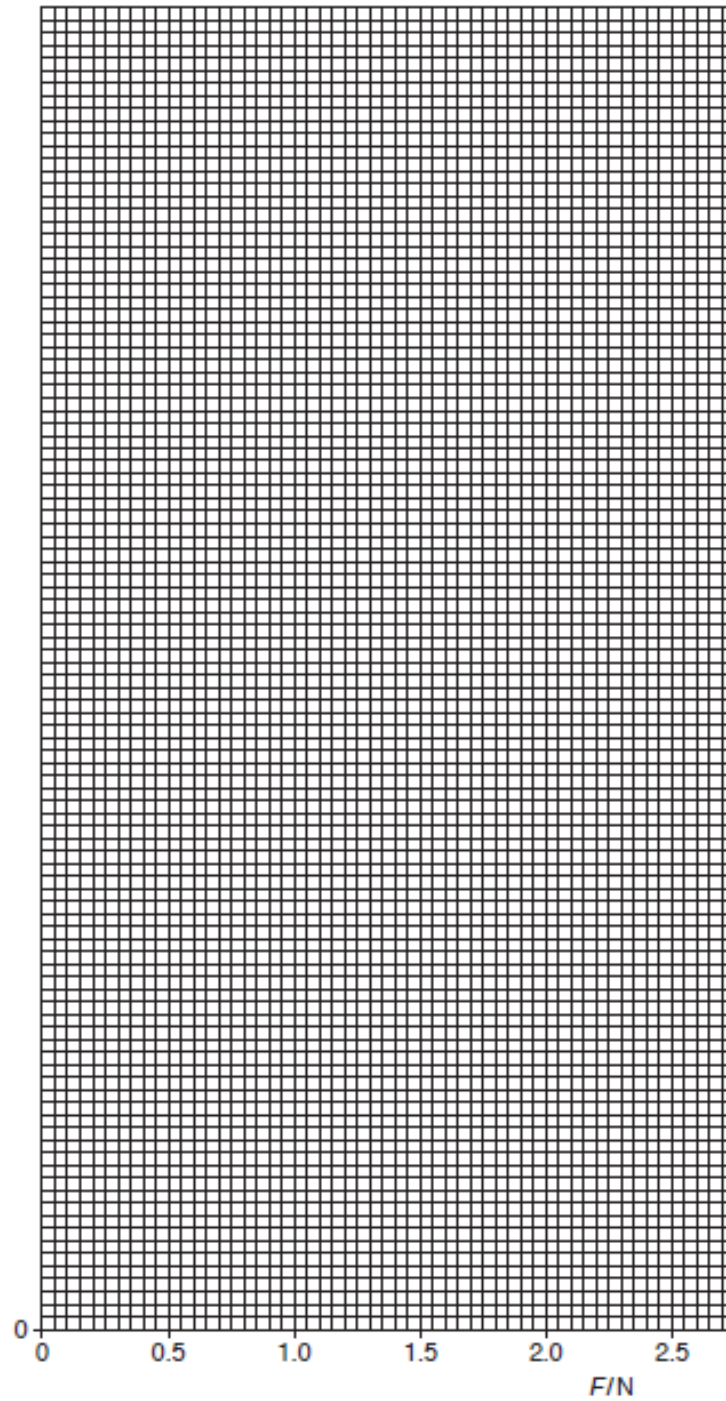


Fig. 2.3

- (d) Use your answer to (c) to determine the experimental value for the force constant k_2 of the two-spring combination. Include an appropriate unit.

$$k_2 = \dots\dots\dots$$

[2]

- (e) State and explain whether your graph shows that the spring combination obeys Hooke's law.

.....
.....
.....
.....

[2]

- (f) The experiment is repeated with a third identical spring added to the bottom of the two springs. The force constant of this new three-spring combination is k_3 .

Determine the ratio

$$\frac{k_3}{k_2}$$

$$\frac{k_3}{k_2} = \dots\dots\dots$$

[2]

Total Marks for Question Set 2: 12

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