

You are going to investigate the relationship between applied force and extension of a spring.

- (a)
- With a small piece of plasticine, fix the pin **P** at right angles to the spring, as shown in Fig. 2.1. Hang the spring from the metal rod of a clamp.
 - Attach the mass carrier to the spring.
 - Fix the metre rule vertically in the clamp close to the spring with its zero mark at the bottom.

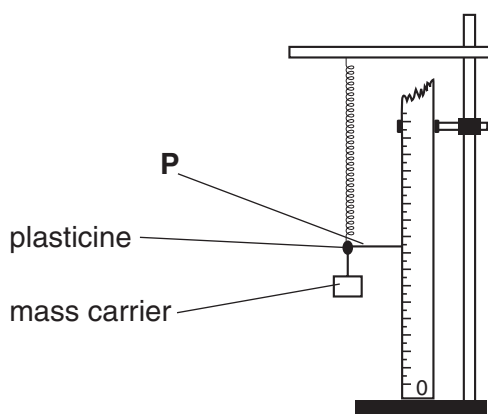


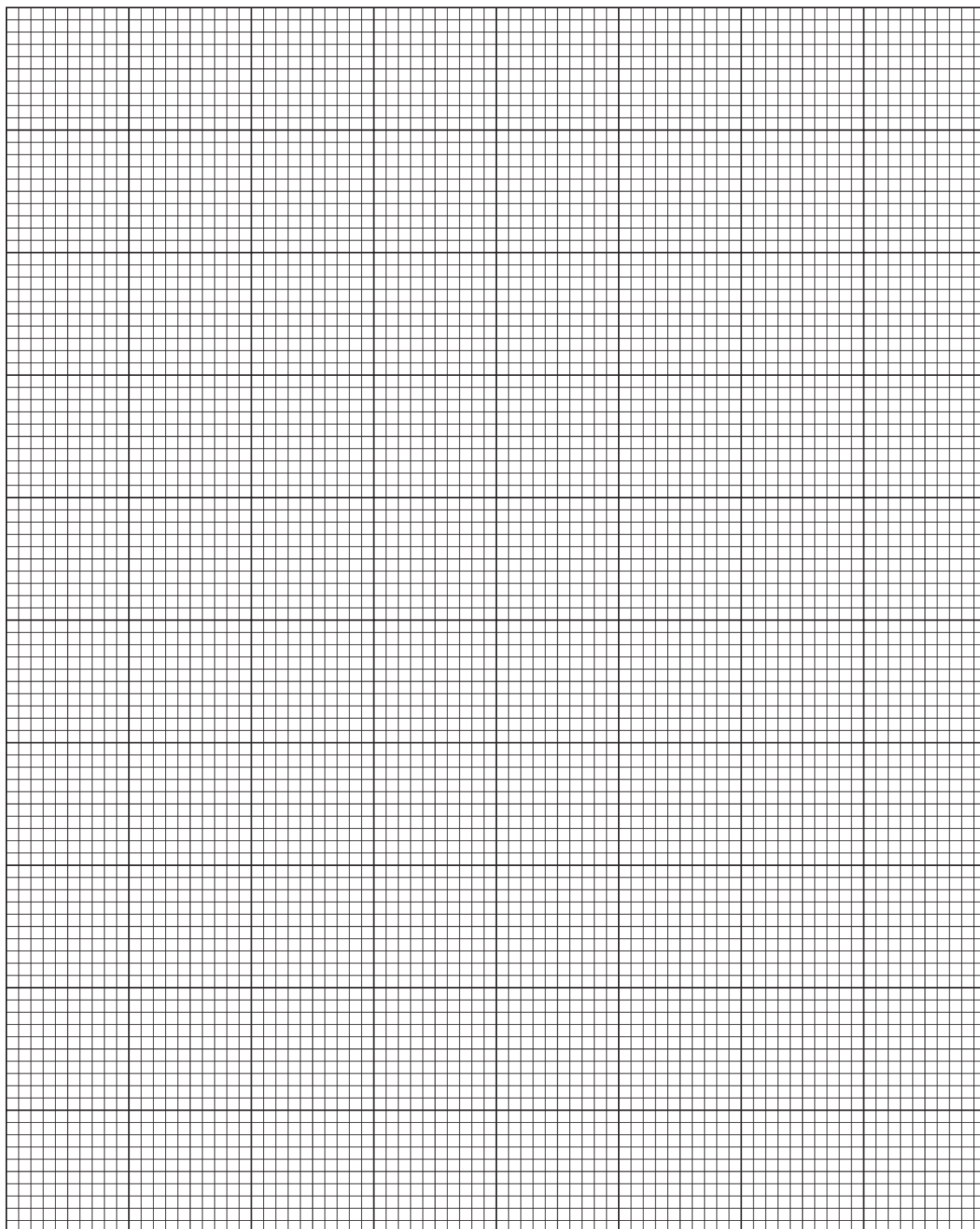
Fig. 2.1

- Make sure that you have left enough space under the spring for it to stretch at least 30 cm when the masses are hung on it.
- (i) Read off the height, h_0 , of the pointer on the metre rule. Record h_0 in millimetres in the table Fig. 2.2.
- Now add 50 g to the carrier and read off the new height, h , of the pointer. Record h in the table Fig. 2.2. Repeat by adding further 50 g masses until you have added a total of 250 g.
- (ii) Complete the table, noting that you are required to convert each mass into a force, (1 kg is 10 N) and calculate the total increase in length of the spring each time.

total mass added / g	force / N	pointer reading h / mm	total increase in length (extension) = $h_0 - h$ / mm
0	0	$h_0 =$	0

Fig. 2.2

- (b) On the graph grid provided, plot a graph of the extension of the spring (vertical axis) against the force. Draw the best straight line through these points.



[4]

- (c) Read off from your graph the extension produced by a force of 3.5 N.

extension =mm [1]

(d) What is the relationship between the applied force and extension of the spring?

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.....[2]

(e) A spring is made from thicker wire and the same experiment carried out. Draw a line on your graph for a spring made from this thicker wire. Label the line 'thicker wire'. [1]

(f) Describe how you would find the mass of an object using the experiment already carried out. You need to state the measurements you would make and how the mass would be calculated.

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.....[3]