

Force and Extension of a Spring

Aim: investigate how the **force** on a spring affects its **extension**.

Apparatus — tick each item as you add it to your diagram

draw your set-up here

Use these to draw your set-up:

☐ clamp stand

☐ boss & clamp

☐ spring

☐ metre ruler

☐ mass hanger & 50 g masses

☐ set square

Method — fill in the gaps

1. Measure the _____ of the spring with a ruler.

2. Add a 50 g mass onto the spring.

3. Calculate the force: $F = m \times g = 0.050 \text{ kg} \times 9.8 = \text{_____ N}$

4. Measure the _____ of the spring with a ruler.

5. Calculate the extension: extension = _____ - _____

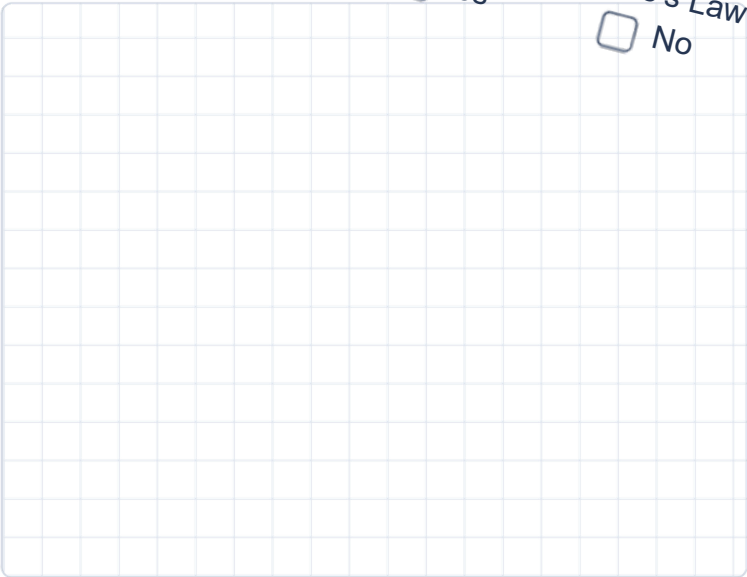
6. Add another 50 g mass onto the spring and repeat steps 2–5, five more times.

7. Plot a graph of _____ (y) against _____ (x).

Results

mass / g	Force / N	original length / cm	stretched length / cm	extension / cm

Graph



Conclusion

SENTENCE STARTER

The _____ is / is not directly proportional to the _____, because the graph is / is not a _____ through the _____, up to the limit of proportionality at _____ N.

The _____ (does/ does not) obey Hooke's Law, *up to _____ N **delete if appropriate*

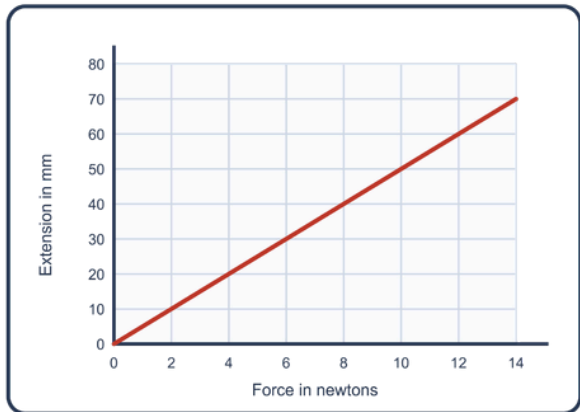
Hooke's Law and Elastic Behaviour

Hooke's Law

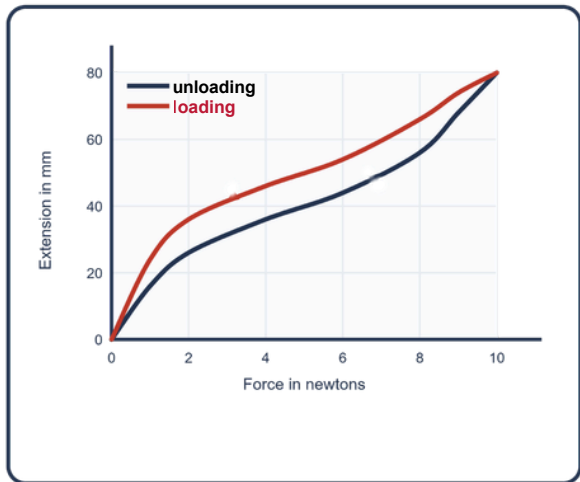
Elastic Behaviour

Define what it means for a material to be *elastic*:

☐ used "original shape / length" ☐ used "forces removed"



Explain if this graph shows an object which obey's Hooke's Law. [3 marks]



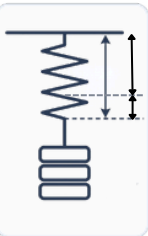
The elastic band — loading and unloading

Does the elastic band obey Hooke's law? Tick a box, then explain your answer.

☐ Yes ☐ No

Both curves return to the origin. What does this tell you about the band?

Exam-Style Questions



Question 1 [2 marks]

Which measurements do you need to take to check if this spring obey's Hooke's Law?



Question 2 [4 marks]

The elastic band above gives the loading and unloading graph.

- (a) Does the band obey Hooke's law? Explain your answer. (2)
 (b) Explain how the graph shows that the band behaves elastically. (2)