Forces and elasticity

Name _____ Class _____ Date _____

Springs and elastic objects stretch when forces act on them. Up to a point, the extension is **proportional** to the force.

KEY EQUATION

$$F = k\,e$$

F = force (N)
k = spring constant (N/m)
e = extension (m)
Valid up to the limit of proportionality.

WORKED EXAMPLE

A spring stretches 0.05 m with a 2 N force.
k = F ÷ e = 2 ÷ 0.05 = **40 N/m**

Section A · Recall

Grade 4–5

1 Explain the difference between elastic and inelastic deformation. [2]

2 Why must more than one force act to stretch a spring? [1]

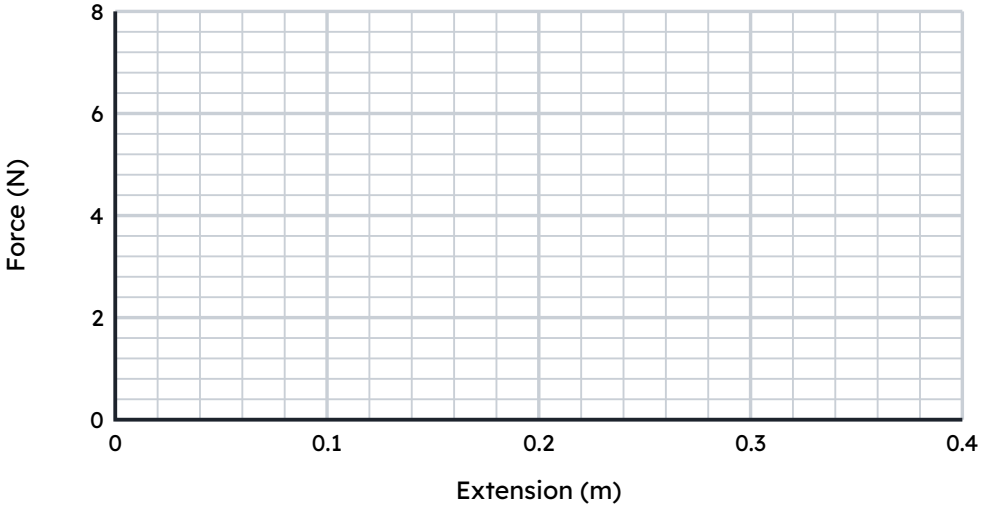
3 A spring has k = 25 N/m. Calculate the force needed to stretch it by 0.2 m. [2]

Section B · Required practical

Grade 5–6

4 A student adds weights to a spring and measures the extension.

Force (N)	Extension (m)
0	0.00
1	0.04
2	0.08
3	0.12
4	0.16
5	0.20
6	0.26
7	0.36



a Plot the results and draw a line of best fit. [3]

b Use the straight part of the graph to calculate the spring constant. [2]

c Describe what happens after the force reaches 5 N. [1]

Section C · Stretch

Grade 7+

5 Calculate the elastic potential energy stored in the spring when the force is 4 N. [3]

Exam-style question

AQA style

6 Describe how the student could carry out the investigation to get accurate results.

[6]

Total: _____ / 20

How confident am I?	Not yet	Nearly	Got it
I can describe elastic and inelastic deformation	☐	☐	☐
I can use F = ke	☐	☐	☐
I can describe the force and extension practical	☐	☐	☐