Oxford Cambridge and RSA

GCSE Physics A (Gateway)

J249/03 Physics A P1-P4 and P9 (Higher Tier)

Question Set 5

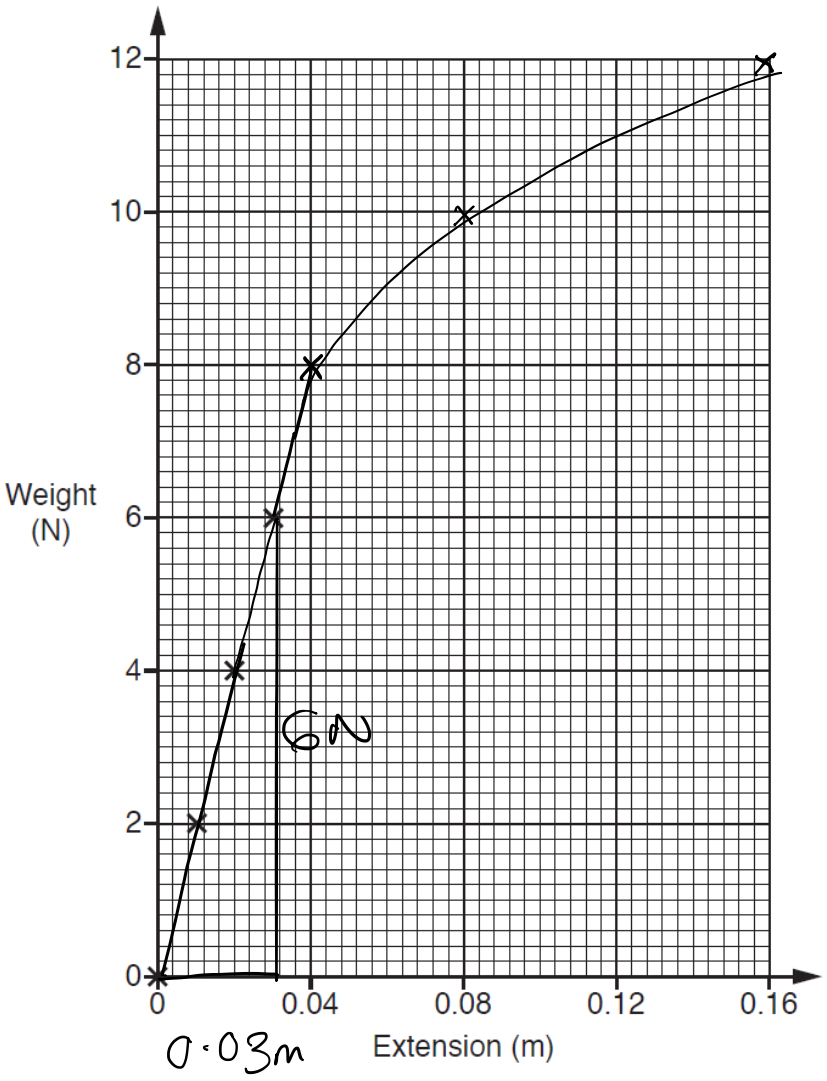
1 A student hangs a length of copper wire from the ceiling.

She adds weights to the bottom of the wire and measures the extension of the wire.

Look at a table of some of her results.

Weight (N)	Extension (m)
0	0
2	0.01
4	0.02
6	0.03
8	0.04
10	0.08
12	0.16

(a) **(i)** Plot the values on the graph. Some have been done for you.



[2]

(ii) Draw a line of best-fit on the graph.

[1]

(iii) Describe **and** explain the shape of the graph.

Extension increases directly proportionally to Force (weight) therefore obeying Hooke's law. Then the elastic limit is reached and extension increases not obeying Hooke's law.

[3]

(b) Calculate the spring constant for the 0 – 6 N part of the graph.

Use the equation: Force = Spring constant × Extension

$\frac{F}{x}$ = spring constant

$\frac{6}{0.03} = k = 200$

Answer = ... 200 ..... N / m

[3]

(c) Calculate the work done in stretching the wire to 0.04 m.

$WD = E_E = \frac{1}{2} k x^2$

$= \frac{1}{2} \times 200 \times 0.04^2 = \frac{4}{25} = 0.16$

Answer = ... 0.16 ..... J

[2]

Total Marks for Question Set 5: 11

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