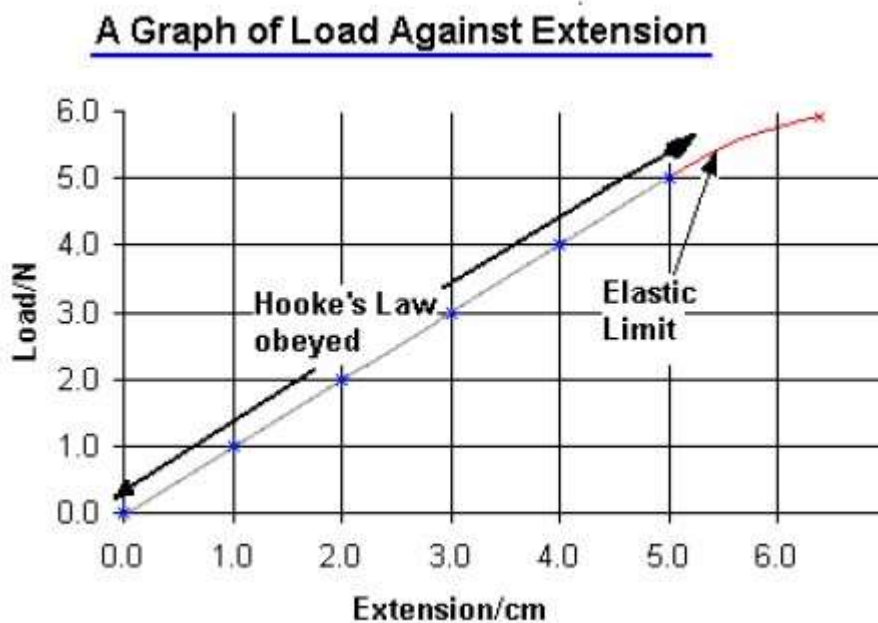


HOOKE'S LAW[MARCSHEME]

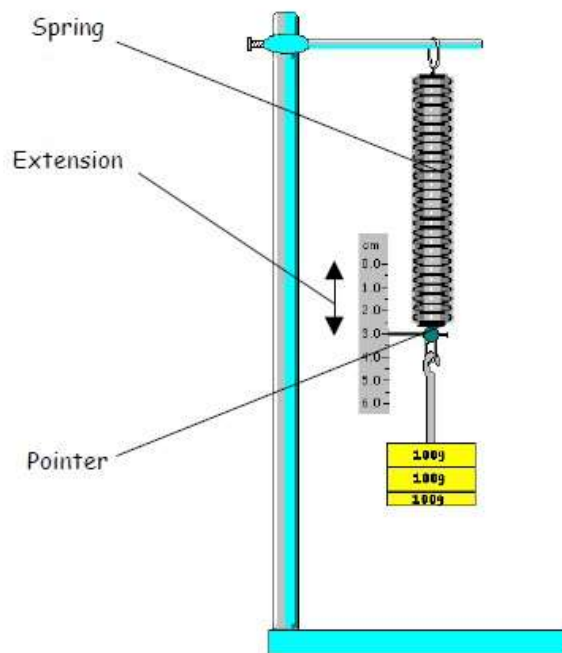
1. Provided the elastic limit has not been exceeded, the extension is directly proportional to the load.
2. Ans



The gradient gives a value for k and the steeper the line, the stronger the spring.

3. Hooke's Law Experiment

Diagram



Method

Set up the apparatus as shown, but with no load. Try and arrange for the pointer to be exactly on zero, this makes it easy for the extension to be measured as each 50 or 100 g mass is added. Next carefully add fifty or one hundred gram masses and record the extension each time.

4. (a) Using $F = kx$ hence $k = F/x = 100/10 = \underline{10 \text{ g/cm}}$
 (b) $X = F/k = 75/10 = \underline{7.5 \text{ cm}}$
 (c) Double spring becomes twice as strong/stiff so k' becomes 20 g/cm,
 and gradient in sketch of Load against Extension doubles in value.
 Using $F = k'x = 20 \times 15 = \underline{300 \text{ g}}$
 (d) Gradient in sketch of Load against Extension halves in value,
 spring now becomes half as strong/stiff so $k'' = 5 \text{ g/cm}$
 $F = k''x = 5 \times 30 = \underline{150 \text{ g}}$
5. (a) All five points correct – 2 marks
 Four points correct – 1 marks
 Three or less – no marks
 [Either by showing plots or by drawing correct straight line through points] 2
- (b) (i) Either continued as a straight line; [must be drawn with ruler]
 or gradient steeper; 1
- (ii) Answers linked to line drawn in part (i)
 Either
 spring obeys Hooke's Law /
 regular increases in load produce regular increases in extension /
 OWTTE /
 elastic limit not exceeded;
 or
 will start to stretch permanently /
 elastic limit exceeded /
 has stretched too far /
 (proportionality aspect of) Hooke's Law not obeyed; 1

[4]

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