WJEC Wales Physics GCSE

SP2.3: Hooke's Law

Practical Flashcards

Outline the basic steps of the practical.

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1. Hang a spring from a clamp stand alongside a metre rule.
2. Measure the spring's initial length.
3. Add 10 N weights one by one and record the extension each time.
4. Plot a graph of extension against force.

What piece of apparatus is used to secure the clamp stand to the desk and why?

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1. A G-Clamp, so that the clamp does not tip over whilst adding masses.
2. The clamp produces a moment which counteracts the moment caused by the masses so the stand remains in equilibrium.

How do you calculate the extension of the spring when you add masses?

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Subtract the extended length of the spring from the original unstretched length.

What can you add to the spring to ensure that the extension measurements are accurate?

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A pointer (e.g. a splint) attached horizontally to the base of the spring and extending across the metre rule. This will make reading the length easier.

What piece of safety equipment should be used throughout this experiment and why?

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Safety glasses should be worn in case of the spring breaking or becoming unattached and damaging your eyes.

What other safety precautions should be taken?

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You should avoid standing with your feet underneath where the weights are hanging in case they fall.

What graph should you plot with your results? What would you expect it to look like?

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Extension against weight. You would expect it to be a straight line passing through the origin. The variables should be directly proportional.

What is the name of the relationship between extension and force? State the relevant equation.

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Hooke's law

Force = Spring constant x Extension

What type of energy is stored in the spring as it is stretched?

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Elastic potential energy

What equation can be used to calculate the elastic potential stored in the spring?

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Elastic potential energy = 0.5 x Spring constant x Extension^2

$$E = \frac{1}{2} kx^2$$

How can you use your apparatus and graph to work out the weight of an unknown object?

How can you use your apparatus and graph to work out the weight of an unknown object?

1. Hang the object on the spring and record the extension it produces.
2. Draw a line from that extension on your graph until it meets your plotted line and then read off the corresponding weight.