OCR (A) Physics A-level

PAG 02.2 - Investigating Springs in Series and Parallel

Practical Flashcards

What safety precaution should be taken when adding masses to a spring?

What safety precaution should be taken when adding masses to a spring?

Safety goggles should be worn in case the spring snaps. Care should be taken to ensure that the load applied to the spring doesn't exceed the spring's capacity.

State Hooke's Law in words.

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Hooke's Law states that the extension of a spring is directly proportional to the load applied, up to the limit of proportionality.

Define Young's modulus.

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Young's modulus is the ratio of stress to strain.

What is the difference between a spring constant and a Young modulus?

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A spring constant depends on the object's shape whereas a Young modulus is a material property and so is independent of shape.

How can the force applied by a mass be calculated?

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The force will equal the weight of the mass:

$$F = mg$$

How do you connect springs in series?

How do you connect springs in series?

Series springs are springs that are connected end to end.

How do you connect springs in parallel?

How do you connect springs in parallel?

Parallel springs are springs that are side-by-side and share the load.

How do you calculate a spring's extension?

How do you calculate a spring's extension?

Extension = Extended Length - Original Length

What is an elastic deformation?

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An elastic deformation is one in which the object will return to its original shape when the deforming force is removed.

What is the limit of proportionality?

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The limit of proportionality is the point beyond which the extension and load are no longer directly proportional.

Why must you ensure you don’t add too large a load to your spring configurations?

Why must you ensure you don't add too large a load to your spring configurations?

If the load is too high, the springs may exceed their elastic limit and deform plastically. This means Hooke's Law will no longer apply. Excessive loads may also lead to the springs snapping.

What graph can you plot for the series arrangement?

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A graph of extension against the number of springs can be plotted.

How can the strain be calculated for the series arrangement?

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The strain is given by: x/NL

This can be obtained by multiplying the gradient of the graph by 1/L.

How can the spring constant be calculated for springs in series?

How can the spring constant be calculated for springs in series?

The spring constant for springs in series is given by the inverse of the sum of the inverses of the individual spring constants:

$$1/K = 1/K_1 + 1/K_2 \ldots + 1/K_{\square}$$

How can the spring constant be calculated for springs in parallel?

How can the spring constant be calculated for springs in parallel?

The spring constant for springs in parallel is equal to the sum of the individual spring constants:

$$K = K_1 + K_2 \ldots + K_{\square}$$

What safety precaution should be taken when hanging springs and masses from a clamp stand?

What safety precaution should be taken when hanging springs and masses from a clamp stand?

A counterweight or G-clamp should be added to the base of the clamp stand to provide a counter-moment and prevent toppling.