WJEC (Eduqas) Physics A Level

SP1.1b - Determination of Unknown Masses Using the Principle of Moments

Practical Flashcards

What is a moment?

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A moment is a measure of the turning effect of a force.

How is a moment calculated?

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Moment = Force x Perpendicular Distance from the Line of Action of the Force

What is the unit of a moment?

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Nm

Newton-Metres

What is the principle of moments?

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The principle of moments states that for an lever to be in equilibrium, the sum of the clockwise moments must equal the sum of the anticlockwise moments about the pivot.

If a mass is hanging from a horizontal rod, what is the force that the mass exerts on the rod?

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The force exerted is equal to the weight:

Force = Mass x Gravitational Field Strength

$$F = mg$$

If the pivot point is not at the centre of the ruler, what additional moment must be included in your calculations?

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The weight of the ruler will also produce a moment. The weight will act through the centre of the ruler, and so the moment produced will equal the weight multiplied by the distance of the pivot from the centre.

What assumption is being made when taking the centre of mass of the ruler to be at its geometric centre?

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Taking the centre of mass to be at the geometric centre of the ruler assumes that the ruler has a uniform mass distribution across its full length i.e. its density must be uniform.

What will occur when the clockwise and anticlockwise moments acting on a horizontal lever are equal?

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If the clockwise and anticlockwise moments acting on the lever are equal, it would be in equilibrium and so will remain at rest in a horizontal position.

Other than the principle of moments, what is the other condition required for an object to remain in equilibrium?

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The horizontal and vertical resultant forces must both equal zero.

How is vertical force equilibrium maintained in this experiment?

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The pivot will produce an upwards reaction force equal in magnitude to the sum of all the downwards acting weights. This results in a vertical resultant force of zero and so vertical equilibrium is maintained.

What safety precautions should be taken in this experiment?

What safety precautions should be taken in this experiment?

Never stand directly below hanging masses since if they fall, they could cause a foot injury. Ensure they are securely fastened to reduce the likelihood of them falling.