CAIE Physics IGCSE

Topic 1.5 - Forces

Flashcards

What effects can a force have on an object?

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A **force** can alter **shape and size**, or **speed and direction**.

How can the effect of force on an elastic objects shape (specifically its extension) be investigated?

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- An object's initial length is measured with a ruler.
- Masses are attached to the object incrementally.
- The object's length is measured and recorded after the addition of each.
- Extension = new length - initial length
- All these steps are repeated 3 times and an average extension found for each mass.
- Mass is multiplied by 9.8N/kg to give the force causing each extension.

What is the spring constant (plus the equation to calculate it)? (supplement)

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The **force** required **per unit** of **extension**.

spring constant = force applied / extension

units = N/m

At what point does the equation for the spring constant no longer apply? (supplement)

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The **limit of proportionality**.

What does the limit of proportionality look like on an extension-load graph? (supplement)

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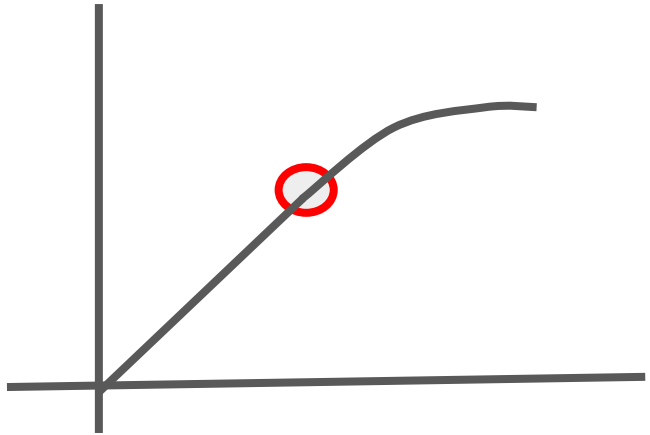
Where the graph stops being linear.



Define ‘resultant force’.

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A **single force** with the same effect as the **sum** of all the **individual** forces acting on an object (taking into account direction).

What happens if a resultant force acts on an object?

What happens if a resultant force acts on an object?

It causes a change of momentum in the direction of the force.

How can a resultant force change the motion of an object?

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It can change an object's velocity either by changing its…

- Speed
- Direction

How can the resultant force be found from forces acting along the same straight line?

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Sum of all forces acting in one direction - sum of those acting in the opposite direction.

How can the resultant force be found from forces acting at right angles to one another?

How can the resultant force be found from forces acting at right angles to one another?

Graphically (by drawing each to scale) or by calculation (using pythagoras and trigonometry).

What happens if there is zero resultant force?

What happens if there is zero resultant force?

The object will remain stationary, or (if moving) will continue to move in the same direction with the same speed.

How is acceleration related to the resultant force acting on an object and its mass?

(supplement)

How is acceleration related to the resultant force acting on an object and its mass? (supplement)

Acceleration is proportional to the resultant force acting on it and inversely proportional to the object's mass.

force=mass × acceleration F=ma

In terms of a resultant force, how do objects move in a circular motion? (supplement)

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A resultant force continually acts perpendicular to the object's direction of motion, enabling velocity to be constantly changing (always changing direction).

What will happen to an object in circular motion if force increases but mass and radius are constant? (supplement)

What will happen to an object in circular motion if force increases but mass and radius are constant? (supplement)

Its speed will increase.

What will happen to an object in circular motion if force increases but mass and speed are constant? (supplement)

What will happen to an object in circular motion if force increases but mass and speed are constant? (supplement)

The radius of its circular motion will decrease.

What will need to happen for an object in circular motion to maintain a constant radius and speed if force increases? (supplement)

What will need to happen for an object in circular motion to maintain a constant radius and speed if force increases? (supplement)

The force must increase.

Define friction.

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Friction is the force providing resistance to the motion of two surfaces sliding past each other.

Give an example of a frictional force.

Give an example of a frictional force.

Air resistance.

What is a pivot point?

What is a pivot point?

The point at which an object can rotate about.

If force is applied in the same line as the pivot, what happens to the object?

If force is applied in the same line as the pivot, what happens to the object?

The object will not rotate, and remains stationary.

What is a moment?

What is a moment?

The rotational (or turning) effect of a force.

Give the equation for moments.

Give the equation for moments.

moment (Nm) = force (N) x distance (m)

(note: distance is the **perpendicular distance** from the force to the pivot)

When does rotational equilibrium occur?

When does rotational equilibrium occur?

When the sum of clockwise moments = the sum of anticlockwise moments

This is the **principle of moments.**

What is a centre of gravity?

What is a centre of gravity?

A single point through which the force of an object's weight acts. (This is a modelling assumption).

Describe how to find the centre of gravity of a plane lamina.

Describe how to find the centre of gravity of a plane lamina.

- Hang up the lamina and suspend a plumb line (thread) from the same place.
- Mark the position of the plumb line.
- Repeat with the lamina suspended from different places.
- Where these lines intersect is the centre of gravity.

How does the position of the centre of gravity affect the stability of an object?

How does the position of the centre of gravity affect the stability of an object?

- If the centre of mass is below the point of suspension of an object, it will be in stable equilibrium.
- If the centre of mass is above the point of suspension of an object, it will be in unstable equilibrium.
- If the line of action of the object's weight moves outside the base, it will topple.