

# OCR A-Level Physics

## 3.2 Forces in Action

### Flashcards

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Describe what happens when a resultant force  $F$  acts on a body with mass  $m$ .



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The body will accelerate in the direction of the resultant force. The resultant force is related to mass and acceleration by the formula:

$$F = ma.$$



Give 3 examples of common forces and explain briefly what they do.



# Give 3 examples of common forces and explain briefly what they do.

Any 3 of the following:

- Weight – the gravitational force acting on an object, through its centre of mass.
- Friction – the force that arises when two surfaces rub against each other.
- Drag – the resistive force on an object travelling through a fluid (e.g. water or air).
- Tension – the force within a stretched cable or rope.
- Upthrust – the upward buoyancy force acting on an object when it is in a fluid.
- Normal Contact Force – the force arising when an object rests against another object. It acts perpendicular to the plane of contact.



# What is meant by drag?



## What is meant by drag?

An object moving through a fluid experiences a drag force acting on it. Drag is a frictional force that opposes motion. In air this is air resistance.



# What is meant by terminal velocity?





## What is meant by terminal velocity?

When the forces acting on the falling object (e.g. drag and weight) become balanced so the resultant force is 0. The acceleration becomes zero and the object is moving at maximum velocity.



# What is the principle of moments?



# What is the principle of moments?

For an object in equilibrium, the sum of the clockwise moments is equal to the sum of the anticlockwise moments.



# What is a moment?



What is a moment?

A turning force:

*force  $\times$  perpendicular distance*

(perpendicular distance from the point to the line of action of the force)



# What is meant by a couple?



## What is meant by a couple?

A pair of equal and opposite coplanar forces that have equal magnitude and opposite direction, applied to a body parallel to each other but not along the same line. For example:



If you have a uniform object, where would its centre of mass be?





If you have a uniform object, where would its centre of mass be?

At the geometric centre of the object.



Describe what is meant by density.



Describe what is meant by density.

The mass per unit volume of a substance. The unit is  $\text{kg m}^{-3}$ .



Describe what is meant by pressure.



Describe what is meant by pressure.

The pressure is the normal force exerted on a surface per unit area. It is measured in Pascals (Pa), where  $1 \text{ Pa} = 1 \text{ N m}^{-2}$ .



What is the force that an object submerged in a fluid experiences?



What is the force that an object submerged in a fluid experiences?

It experiences an upwards force called upthrust. This is because the pressure at the bottom surface of the object is greater than at its top surface.



State Archimedes' principle.





## State Archimedes' principle.

The upthrust exerted on a body immersed in fluid, whether partially or fully submerged, is equal the weight of the fluid that the body displaces. An object will sink if the upthrust is smaller than the weight. For a floating object, its weight is equal to the upthrust.

