CAIE Physics A-level

3 - Dynamics

Flashcards

If an object is in equilibrium it means the object is…

If an object is in equilibrium it means the object is …

Not accelerating; it is either:

- Stationary.
- Moving at a constant velocity.

Which of Newton's Laws states that 'every action force has an equal and opposite reaction force'?

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Newton's third law.

What is Newton's second law?

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$$F = ma$$

Where F is resultant force (N), m is mass (kg) and a is acceleration in the direction of the resultant force (ms^{-2})

Explain why an object of greater mass will have a greater resistance to changes in its motion than an object of smaller mass?

Explain why an object of greater mass will have a greater resistance to changes in its motion than an object of smaller mass?

$$a = F/m$$

Therefore, the object of greater mass requires a larger force to cause the same acceleration on the object, in any direction.

What is Newton's first law?

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An object at rest or moving with constant velocity will stay that way unless a resultant force acts upon it.

What is weight?

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Weight (N) is the product of mass (kg) and the acceleration due to gravity, g (ms^{-2})

$$W = mg$$

What is meant by terminal velocity?

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When the air resistance and thrust force becomes balanced the resultant force is 0. The acceleration becomes zero and the object moves at a constant maximum velocity.

What is the difference between elastic and inelastic collisions?

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In an elastic collision, the kinetic energy before is equal to the kinetic energy afterwards – no energy is lost. However, in an inelastic collision, the kinetic energy at the end is not equal to the kinetic energy at the start – some energy is lost to the surroundings.

Give an equation that can be used to calculate momentum.

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$$momentum = mass \times velocity$$

The units of momentum are $kgms^{-1}$

State the principle of conservation of momentum.

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In an isolated system, the total momentum of the system is always conserved i.e. if an object collides with another object, the total momentum of the objects after a collision occurs is equal to the momentum of the objects before the collision.

True or false? Linear momentum is only conserved in elastic collisions.

True or false? Linear momentum is only conserved in elastic collisions.

False, linear momentum is always conserved.

The rate of change of momentum can also be described as...

The rate of change of momentum can also be described as...

...the resultant force.

What is impulse?

What is impulse?

The change in momentum.

$$F\Delta t = \Delta(mv)$$

What does the area underneath a force-time graph represent?

What does the area underneath a force-time graph represent?

The impulse i.e. the change in momentum.

What is the equation used for the principle of conservation of momentum in one-dimensional collisions?

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$$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$$

A force of 18N acts on an object of 6kg, what is the object's acceleration?

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$F = ma$, rearrange to $a = F / m$

$a = 18/6$

$a = 3ms^{-2}$

True or false? For an elastic collision the relative speed of approach is faster than the relative speed of separation.

True or false? For an elastic collision the relative speed of approach is faster than the relative speed of separation.

False, they are equal.

Are most real life collisions elastic or inelastic?

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Nearly all are inelastic.

Why are most real life collisions inelastic?

Why are most real life collisions inelastic?

This is because some energy is almost always converted to other forms during a collision. As a result kinetic energy is not conserved (so the collision is inelastic).