

WJEC Wales Physics GCSE

2.3 - Work and Energy

Flashcards

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What does it mean if a force is said to do
'work'?



What does it mean if a force is said to do ‘work’?

The force causes an object to be displaced through a distance.



What is the equation used to calculate work done? Give appropriate units.



What is the equation used to calculate work done?
Give appropriate units.

Work done = Force x Distance

$$W = Fd$$

Work done (Joules), Force (Newtons),
Distance (metres)



Under what circumstance is 1 joule of work done?



Under what circumstance is 1 joule of work done?

When a force of 1 Newton causes a displacement of 1 metre.



What occurs when work is done against frictional forces?



What occurs when work is done against frictional forces?

- A rise in temperature of the object
- This is because kinetic energy is converted to heat



Explain the relationship between the force applied and the extension of an elastic object.



Explain the relationship between the force applied and the extension of an elastic object.

The extension is directly proportional to the force applied, provided that the limit of proportionality isn't exceeded.



What is meant by an inelastic deformation?



What is meant by an inelastic deformation?

- A deformation which results in the object being permanently stretched.
- The object doesn't return to its original shape when the force is removed.



What is another word for inelastic deformation?



What is another word for inelastic deformation?

Plastic deformation.



State the equation relating force, spring constant and extension. Give appropriate units.



State the equation relating force, spring constant and extension. Give appropriate units.

Force = Spring Constant x Extension

$$F = kx$$

Force (N), Spring Constant (N/m)

Extension (m)



What type of energy is stored in a spring when it is stretched?



What type of energy is stored in a spring when it is stretched?

Elastic potential energy.



What can extension be replaced with in the equation for spring force?



What can extension be replaced with in the equation for spring force?

Compression.



What type of energy is stored in a moving object?



What type of energy is stored in a moving object?

Kinetic energy.



What happens, in terms of energy, when an object is lifted?



What happens, in terms of energy, when an object is lifted?

Its gravitational potential energy increases.



What is the equation for kinetic energy?
Give SI units for all quantities involved.
(Higher)



What is the equation for kinetic energy? Give SI units for all quantities involved. (Higher)

$$E = \frac{1}{2} m v^2$$

$$\text{Energy} = \frac{1}{2} \times \text{Mass} \times (\text{Velocity})^2$$

Energy (J), Mass(kg), Velocity(m/s)



What is the equation for gravity potential energy? Give SI units for all quantities involved. **(Higher)**



What is the equation for gravity potential energy?
Give SI units for all quantities involved. (Higher)

$$E = mgh$$

Energy = Mass x Gravitational Field Strength x Height

Energy (J), Mass(kg), Gravitational Field Strength (N/kg),
Height (m)



How can the shape of a car be altered to make it more energy efficient?



How can the shape of a car be altered to make it more energy efficient?

- The more aerodynamic the shape, the less energy that is wasted to resistive forces such as air resistance.
- More streamline, less frontal surface area etc.



To stop a car in a given distance, if its velocity is increased, what must happen to the braking force applied?



To stop a car in a given distance, if its velocity is increased, what must happen to the braking force applied?

The braking force must also be increased.



State two consequences of a vehicle undergoing very large decelerations.



State two consequences of a vehicle undergoing very large decelerations.

1. Kinetic energy converted to heat is very high causing brakes to overheat.
2. Loss of control of the vehicle.



Explain how a seatbelt improves a passenger's safety during a collision.



Explain how a seatbelt improves a passenger's safety during a collision.

- The passenger decelerates (from the velocity of the vehicle at impact to a velocity of 0 m/s) meaning they experience a force.
- This force is equal to the rate of change of momentum.
- Seat belts increase the time over which the force is applied, reducing the rate of change of momentum and therefore reducing the force applied on the passenger.

