CIE A-Level Physics
6 - Work, Energy and Power
Flashcards

What is meant by the principle of conservation of energy?

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Energy cannot be created or destroyed, only transferred into other forms of energy.

Therefore the total energy in a closed system will always remain the same.

Define work done.

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Define work done.

Work done is equal to the energy transferred. It is the product of the force applied and the distance moved in the direction of the force.

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Define kinetic energy and give its SI base unit.

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The energy associated with the motion of an object with mass. Its unit is J and its SI base unit is kgm^2s^{-2}.

$$E_k = \frac{1}{2}mv^2$$

Define gravitational potential energy.

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The energy stored by an object at a point in a gravitational field.

$$GPE = mg\Delta h$$

Define elastic potential energy.

Define elastic potential energy.

The energy stored by an object as a result of a reversible change in an object's shape:

$$EPE = 1/2kx^2$$

where k is spring constant N/m and x is the extension in m.

State the principle of the conservation of energy.

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In a closed system, energy cannot be created or destroyed but only transferred from one form to another.

If we consider a closed system where an object is moving up and down, derive a formula for the velocity of an object in a gravitational field.

If we consider a closed system where an object is moving up and down, derive a formula for the velocity of an object in a gravitational field.

All initial GPE is converted to KE as the object falls, and this KE is converted back to GPE as it rises.

Equating KE and GPE gives: $mgh = \frac{1}{2}mv^2$

Rearranging this in terms of v^2 gives $v^2 = 2gh$, so $v = 2gh^{1/2}$

Since mass cancels out, the velocity of the object is independent of mass.

The rate of work done is equal to…

The rate of work done is equal to...

...power.

What is efficiency?

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Efficiency (%) = (The useful output power / total input power) x 100

How can the work done by an expanding gas be calculated?

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Work done = $p\Delta V$

Where p is pressure (which must be constant) and ΔV is the change in the gas's volume.

How can the efficiency of a system that loses energy due to friction be increased?

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Lubricate parts of the system and reduce the number of parts that touch.

Derive power as the product of force and velocity.

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Power = work done / time

(Work done = force x displacement)

Power = force x displacement / time

power = force x velocity