

Non-useful energy stores
Energy stored in a way that is not useful
Most 'wasted' energy is transferred into the thermal energy stores of the surroundings.

Mechanical process
An object moving due to a force acting upon it
EG: push, pull, stretch, squash.

Pushing an object along a rough surface and work is done against frictional forces.

Energy is transferred to the kinetic energy store of the object as it starts to move.

Gravitational force doing work
Objects dropping from a height
Energy transfers mechanically from the object's GPE energy store to the object's KE store.

Dissipation
Thermal energy is transferred to the surroundings
The transfer of thermal energy into the thermal energy store of the surroundings causes the temperature to rise.

Some energy is also transferred to the thermal energy store of the object, the surface and the surroundings due to friction.

The temperature of the object and surroundings increases.

$$\Delta GPE = m \times g \times \Delta h$$

Change in Gravitational Potential Energy = mass X gravitational field strength X change in height.

Work done = force X distance moved in the direction of the force

$$E = F \times d$$

Energy transfer = Work done

Work done
Energy transferred by a force
Energy is transferred when things happen

Energy transfer involves the way energy is stored when systems change

Energy in a system can be changed

- By:
- Work done by forces
 - In electrical devices
 - In heating

Kinetic Energy = $\frac{1}{2} \times \text{mass} \times \text{velocity}^2$

$$KE = \frac{1}{2} \times m \times v^2$$

A force doing work
Objects thrown upwards
Energy transfers mechanically from the initial force exerted by the person, to the KE store of the object to the object's GPE store.

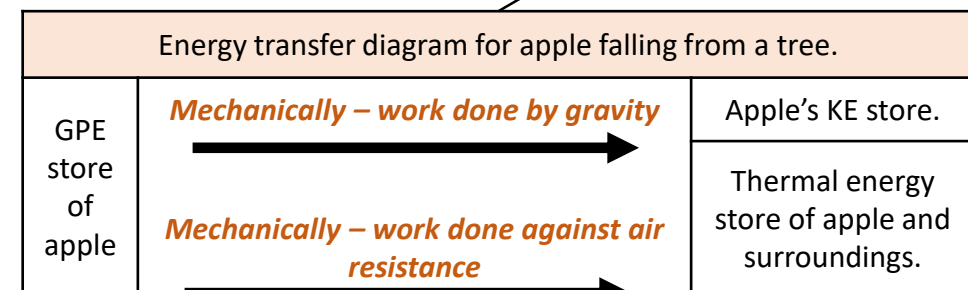
Work

EDEXCEL Topic 8 ENERGY – FORCES DOING WORK

System	A group of objects
Closed	Energy cannot enter or leave the system
Open	Energy can enter or leave the system

Total energy remains the same (No net change).

Energy transfer diagrams
An easy way to see the energy transfers between different energy stores.



Energy transferred	Joule (J)
Force	Newton (N)
Distance	Meter (m)
Gravitational Potential Energy (GPE)	Joule (J)
Mass	Kilogram (Kg)
Gravitational field strength (gfs)	Newton per kilogram (N/Kg)
Height	Meter (m)
Kinetic Energy (KE)	Joule (J)
Velocity	Meter per second (m/s)
Power	Watt (W)
Work done	Joules (J)
Time	Seconds (s)

One Watt
One joule per second

Power
The rate at which energy is transferred
A more powerful crane will lift a box up a certain height, quicker than a less powerful crane.

$$P = E \div t$$

Power = Work done ÷ time

Efficiency = useful energy transferred by the device ÷ total energy used by the device.

Efficiency
How well (or uselessly) a device transfers energy

High efficiency	An energy transfer process that wastes less energy
Low efficiency	An energy transfer process that wastes a lot of energy

