



Key Definitions

Energy system	An object or group of objects that when changed there is a change in the way the energy is stored.
Thermal insulator	A material that prevents the transfer of thermal energy via conduction, convection or radiation.
Specific Heat Capacity	The amount of energy required to raise the temperature of one kilogram of a substance by one degree Celsius.
Power	1.The rate that energy is transferred. 2.The rate that work is done.
Work Done	When a force causes an object to move through a distance
Efficiency	How good a device is at transferring input energy into useful energy.
Dissipated	The transfer of input energy into less useful forms (wasted energy)

Key prefixes

Name	Operation	Standard form
Milli (m)	÷ 1000	× 10 ⁻³
Kilo (k)	× 1000	× 10 ³
Mega (M)	× 1 000 000	× 10 ⁶
Giga (G)	× 1 000 000 000	× 10 ⁹

Key Equations

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

E_k = Kinetic Energy (Joules)

M = Mass (Kg)

V = Velocity (m/s)

$$\text{Gravitational Potential energy} = \text{mass} \times \text{gravity} \times \text{height}$$

E_p = Gravitational Potential Energy(Joules)

M = Mass (Kg)

g = gravity (N/Kg)

h = height (m)

$$\text{Efficiency} = \frac{\text{Useful Output}}{\text{Total Input}}$$

$$\text{Energy Transferred} = \text{Work Done} = \text{force} \times \text{distance moved}$$

$$\text{Power (W)} = \frac{\text{Work done (J)}}{\text{Time taken (s)}} = \frac{\text{Energy used (J)}}{\text{Time taken (s)}}$$

Equations given to you

$$\text{Elastic Potential Energy} = \frac{1}{2} \times \text{spring constant} \times \text{extension}^2$$

E_e = Elastic Potential Energy (Joules)

k = Spring Constant (N/m)

e = extension (m)

$$\text{Energy Transferred} = \text{mass} \times \text{specific heat capacity} \times \text{change in temperature}$$

E = Energy (Joules)

M = Mass (Kg)

C = Specific Heat Capacity (J/Kg°C)

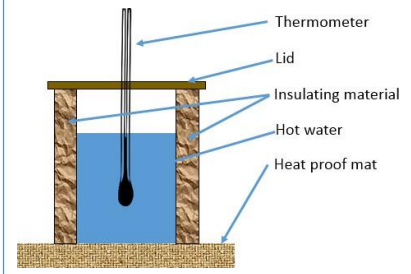
t = Temperature (°C)

Key Units

Energy/Work	Joules (J)
Mass	Kilograms (kg)
Force	Newtons (N)
Speed	Metres per second (m/s)
Power	Watts (W)
Gravitational field strength	Newtons per kilogram (N/kg)
Specific heat capacity	Joules per kilogram per degree Celsius (J/kg°C)

Wind	Not reliable, Visual Pollution, Noisy, Damage Bird life but no air Pollution, Free once installed
Solar	Not reliable as not always sunny, initial cost high No air pollution, free once installed
Hydroelectric	Damage to habitat have to flood the valley, don't work drought but No fuel costs, can store electricity for pumped storage, reliable, good for quick high demand, no air pollution
Geothermal	Only able to use in volcanic areas – heat from Earth drives a turbine, not good for large scale but no air pollution, no fuel costs
Biomass	Air pollution – CO ₂ – greenhouse gas, visual pollution but reliable, gets rid of landfill.
Tidal	Damage to water, habitats fish, visual pollution, expensive to install but reliable – can predict tides, no air pollution, No fuel costs
Wave	Initial cost high, damage fish, visual pollution, not reliable, but no fuel costs, no air pollution
Nuclear	High decommissioning costs, dangerous, water pollution but no air pollution, reliable, generate large amounts of energy.
Coal/oil and gas	Will run out one day, air pollution – CO ₂ – greenhouse gas. Reliable, easy to transport,

Practical – Thermal insulation (Triple only)



Test 1. The effectiveness of different materials as thermal insulators

Test 2. How thickness of a material affects thermal insulation.

