ENERGY

Electric Energy

Mechanical Energy

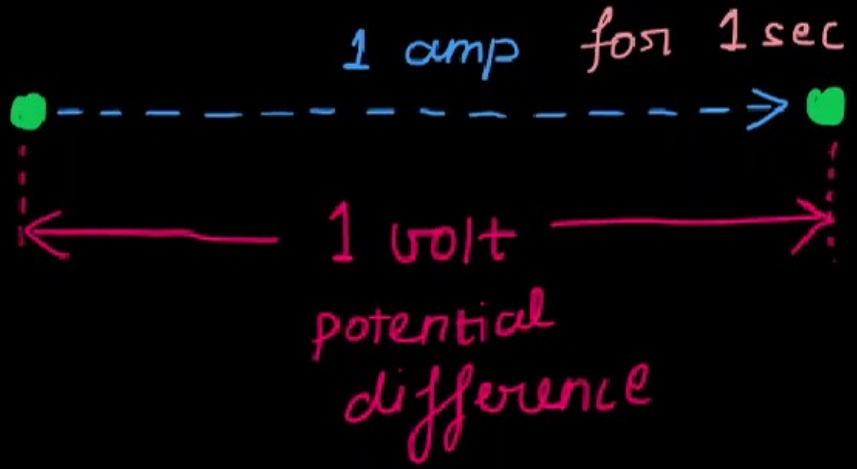
Heat Energy


UNITS OF ENERGY

Electric Energy

* Electric energy $\xrightarrow{\text{measured in}}$ Watt - sec

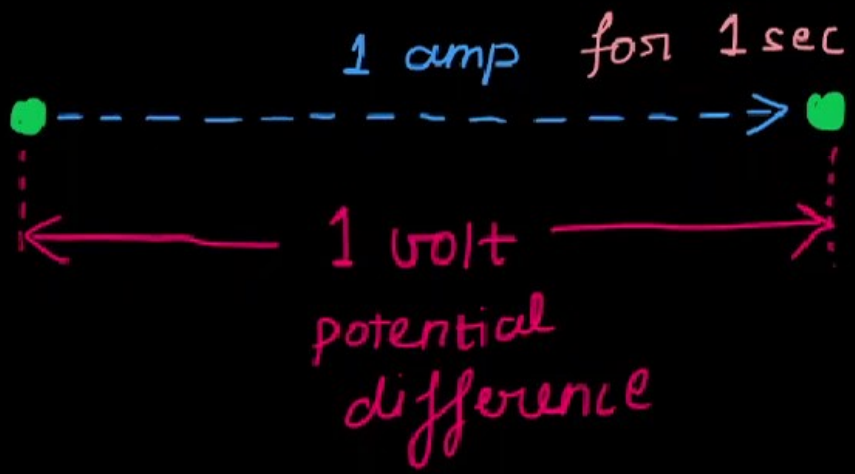
* 1 watt - sec



Electric Energy = volt x current x time

* Electric energy $\xrightarrow{\text{measured in}}$ Watt - sec

* 1 watt - sec



* watt-sec → very small units of electrical energy

El. cm = 1 w-sec

∴ In practice :→ watt-hr or kw-hr

1 watt-hr = 1 watt × 1 hr

= 1 watt × 3600 sec

= 3600 w-sec

1 kw-hr = 1 w-hr × 10^3

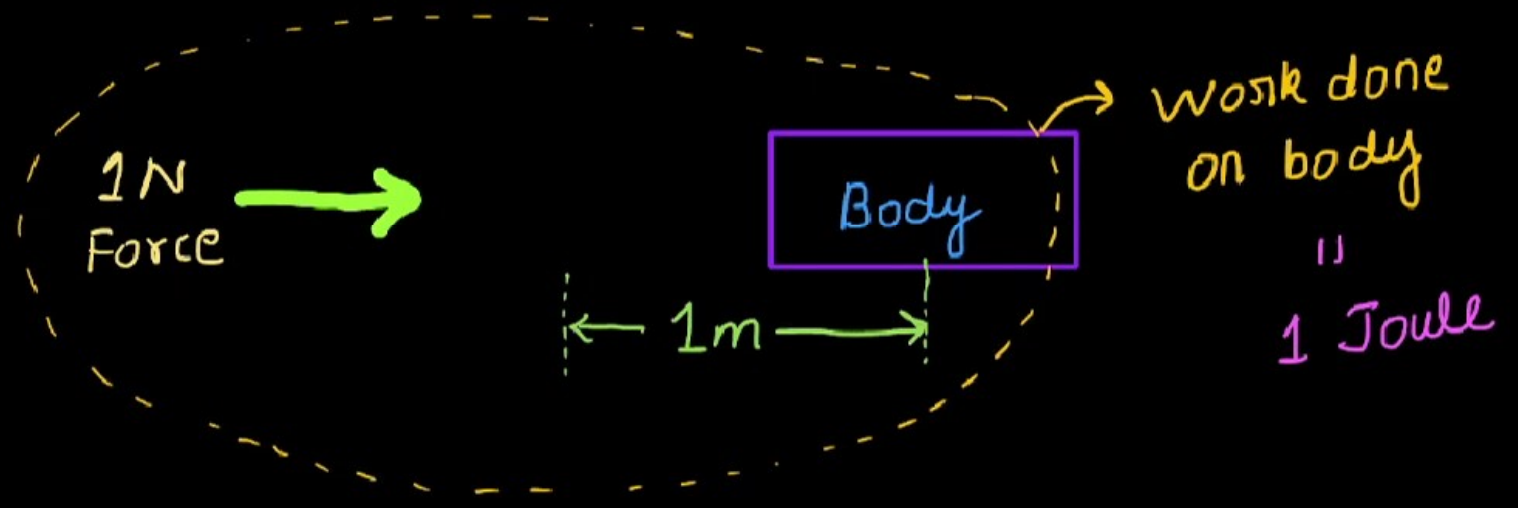
= 3600 × 10^3

= 3.6×10^6 w-sec

#Mechanical Energy = Force (N) X Distance (m)

* Mech. Energy —measured in→ N-m or Joules

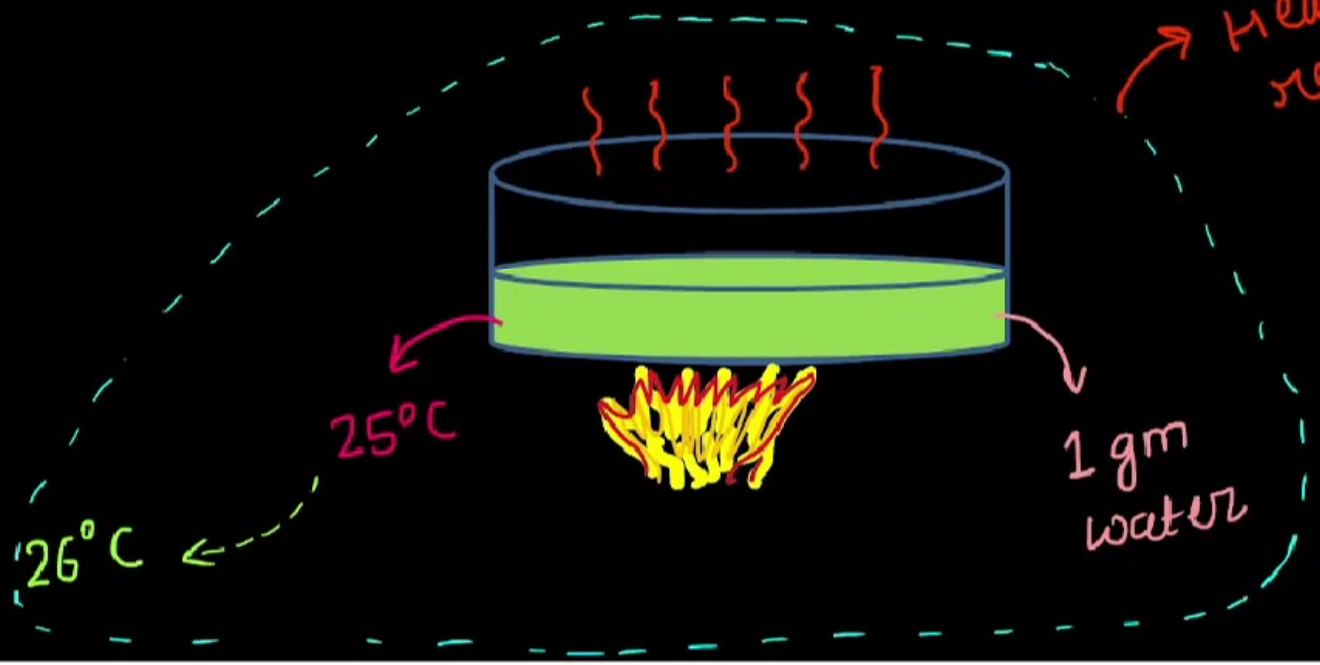
* 1 Joule mech. energy



Heat Energy

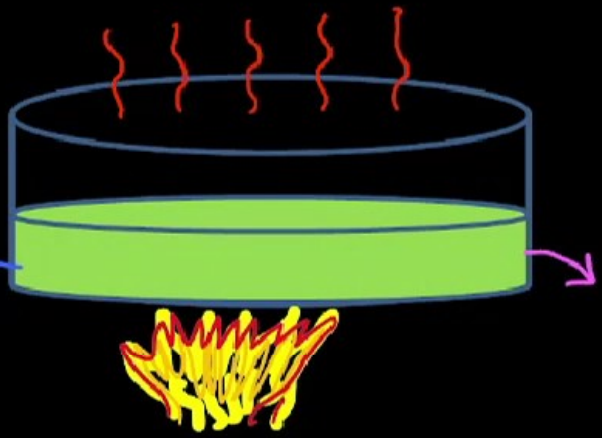
* Heat Energy —measured in→ Calorie or BTU or CHU

* 1 calorie = 1 gm of water x 1°C



* 1 B.T.U = 1 lb of water x 1° F temp change

British Thermal Unit



pound

1 lb of water

25° F

26° F

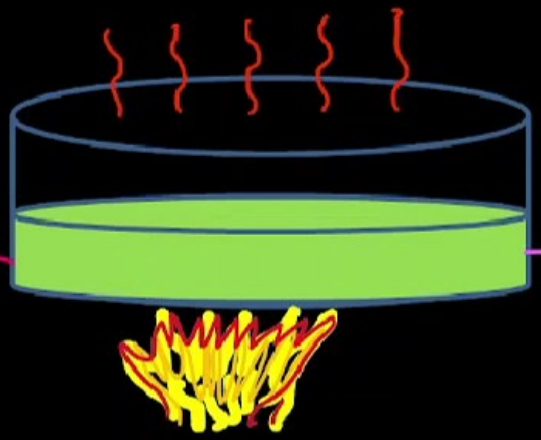
Heat required = 1 B.T.U

* 1 C·H·U· = 1 lb of water x 1°C temp. change

C → Celsius

H → Heat

U → Unit



25°C

26°C

1 Lb of water

Heat Required = 1 C·H·U·


RELATIONS AMONG UNITS

Electrical ⟷ Mechanical

W-sec — Joules

* 1 W-sec = 1 Joule

* 1 kWhr = 36×10^5 Joules

= 3.6×10^6 Joules

= 3.6 Mega Joules

Mechanical ⟷ Heat

Joules ↙ ↘ Calorie / CHU / BTU

* 1 calorie = 4·18 Joules

[1 lb = 453·6 gm]

* 1 CHU = 1 lb. × 1°C

= 453·6 gm × 1°C

1 CHU = 453·6 calorie

* 1 CHU = 453·6 × 4·18 = 1896 Joules

* 1 B.T.U. = 1 lb × 1° F

= 453.6 gm × $\frac{5}{9}$ °C

1 B.T.U. = 252 Calorie

= 252 × 4.18 Joules

1 B.T.U. = 1053 Joules

Electrical ⟷ Heat

Electrical → W-sec

Heat → Calorie

* 1 kWhr = 3.6×10^6 Joules

$$= \frac{3.6 \times 10^6}{4.18} \text{ calorie}$$

1 cal = 4.18 Joules

1 kwhr = 860×10^3 Calorie

1 kwhr = 3418 BTU

1 kwhr = 1898 CHU