

Energy

Energy is carried by electric current to be delivered to any device.

\$\$ Energy ✓

$$E = I V t$$

↙ ↓ ↘
 current volt time (s)
 (A) (V)

$$P = \frac{E}{t} = \frac{I V \cancel{t}}{\cancel{t}} = I V$$

Bright lamp : Energy $\uparrow$
 used 475 k in 5 mins

Dim lamp : Energy $\downarrow$
 used 475 k in 2 hrs

TIME

How much Energy is used per second
 $\downarrow$

Power

$$P_2 = \frac{E}{t} = \frac{475000}{120 \times 60} = \boxed{66 \text{ J/s}}$$

W A T T

$$P_1 = \frac{E}{t} = \frac{475000}{5 \times 60} = \boxed{1584 \text{ J/s}}$$

W a t t

PC

850 W



850 J/s

1 hour

$$850 \times 60 \times 60 = 3 \text{ MJ}$$

Lamp

7 W

BMW

135 kW

135000 W

in 1 hour

$$135 \times 10^3 \times 60 \times 60$$

$$= \boxed{486 \text{ MJ}}$$

house 6000 W

AC 1.5 Hp = 1500 W

Energy bill

$$V = IR$$

$$P = I \cdot IR$$

$$V = IR \quad I = \frac{V}{R}$$

$$P = \frac{V}{R} \cdot V$$

$$P = IV$$

or

$$P = I^2 R$$

or

$$P = \frac{V^2}{R}$$

Electric Company — kWh

↓
Energy

$$E = IVt$$

$$E = Pt$$

PC 850 W

1 hr per day
30 hr / month

$$E = P t = 850 \times 30 \times 60 \times 60 \\ = 92 \text{ MJ}$$

$$\text{KWh} = 1000 \times 60 \times 60 \\ = 3.6 \text{ MJ}$$

$$\frac{92}{3.6} = 25.5 \text{ kWh}$$

$$\text{Cost } 1.5 \text{ £/kWh} = 25.5 \times 1.5 \\ = \boxed{40 \text{ £}}$$

Calculate cost of using 6 lamp
at 7 W continuously for 30 days

$$E = Pt = 7 \times 30 \times 24 \times 60 \times 60 \\ = 18 \text{ MJ}$$

$$\text{kWh} = \frac{18}{3.6} = 5 \text{ kWh}$$

$$\text{Cost } 5 \times 1.5 = \boxed{7.5 \text{ €Gp}}$$

A Kettle has a resistance of 200 Ω . it is plugged into a socket providing 220V
calculate power

$$P = \frac{V^2}{R} = \frac{(220)^2}{200} = \boxed{242 \text{ W}}$$

Bmw 135 kW Petrol

AA 1.5 V 2 A $P = 3 \text{ W}$

$$\text{CAR} = \frac{135000}{3} = 45000 \text{ AA}$$

$$\begin{aligned} \text{battery } 60 \text{ kWh} &= 60 \times 3.6 \times 10^6 \text{ J} \\ &= 216 \times 10^6 \text{ J} \end{aligned}$$

$$9 \times 216 \times 10^6 = 2 \times 10^9 \text{ J}$$

$$@ 135000 \text{ J/s} = \frac{2 \times 10^9}{135000}$$

$$= 14400 \text{ sec}$$

$$= \underline{4 \text{ hrs}}$$

$$9 \times 60 = 540 \text{ kWh} \times 1.5 = \underline{810 \text{ kwh}}$$

