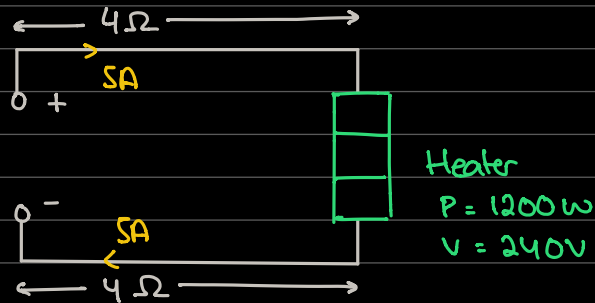# EFFICIENCY : ELECTRICITY

CALCULATING THE EFFICIENCY IN AN ELECTRICAL CIRCUIT

i) Calculate the current in the circuit.

$$P = IV$$
$$1200 = I(240)$$
$$\frac{1200}{240} = I$$
$$5A = I \longrightarrow Ans (i)$$

ii) Calculate voltage dropped across connecting wires

$$V = IR$$
$$V = (5)(4)$$
$$V = 20V \longrightarrow Ans (ii)$$

iii) Calculate voltage supplied by the battery

$$\text{Total Voltage} = 240 + 2(20)$$
$$= 240 + 40$$
$$= 280 V$$

This is because while the heater itself may only demand 240v, the connecting wires cause the voltage demand of the entire circuit to be greater than just 240v.

iv) Calculate the efficiency of the circuit

$$\text{Efficiency} = \frac{240}{280} \times 100 = 85.7\%$$

v) How can this efficiency be improved?

- We can double the diameter of the connecting wires (quadruple the area, hence a 4x drop in resistance)

  ↳ Lower resistance means a lower voltage drop across the wires, hence a more efficient circuit

  Another advantage of using thick wires is that there are less chances of melting due to overheating

  A disadvantage would be that a thicker wire would be costlier