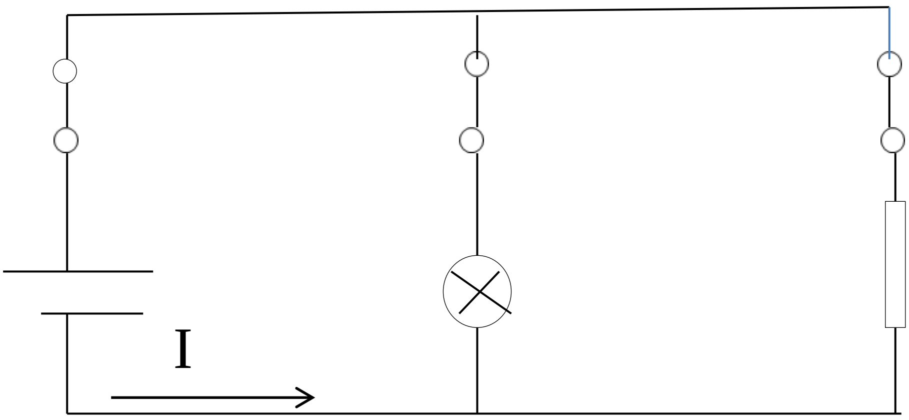
YEAR 09

Physics Homework

Revision of Electric Circuits

Jade has built a simple electrical circuit to power two components. The circuit diagram for Jade's circuit is shown below:



a) *Jade measures the current that is flowing through the bulb in her circuit. The current flowing through the bulb is 0.60 A.*

i. *The current flowing through the cell in Jade's circuit is 1.90 A. Calculate the current flowing through the resistor.* ***Show your calculations****.*

ii. *The potential difference across the bulb is 1.5 V. Calculate the resistance of the bulb.*

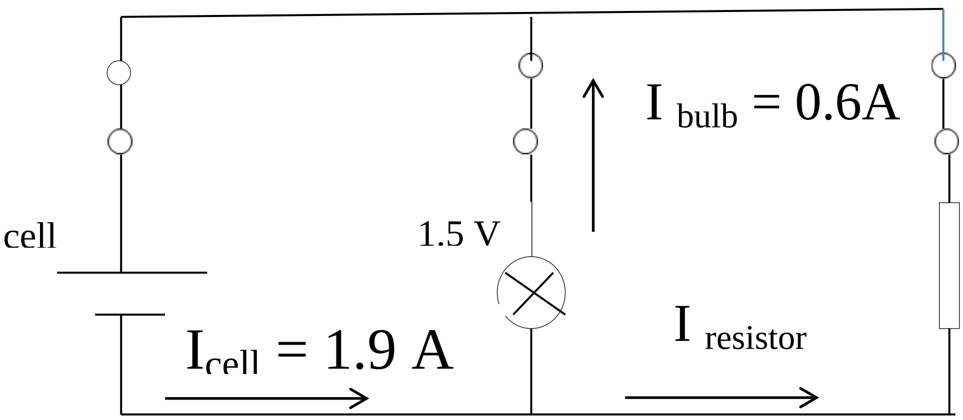
b) *The energy transferred to an electrical component is given by this formula:* ***energy = power of appliance (W) x time (s)***

i. *The bulb in Jade's circuit has a power rating of 40 W. Calculate the energy, in Joules, that the bulb transfers when Jade leaves the circuit switched on for 6 minutes.* ***Show your calculations****.*

ii. *Jade replaces the bulb with one with a much lower power rating. Explain how this will affect the energy transferred by the circuit when it is switched on for 6 minutes?*

Solution

a) i. As shown in the Figure above, the current I leaving the cell will now meet a junction upon which it will be distributed/split to the current flowing through the bulb (I_{bulb}) and the current flowing through the resistor ($I_{resistor}$).
So $I_{cell} = I_{bulb} + I_{resistor}$



We know that the current from the cell is 1.9 A and the current flowing through the bulb is 0.60 A, so the current flowing through the resistor will be $I_{resistor} = I_{cell} - I_{bulb} = 1.90 - 0.60 =$ **1.30 A**.

iii. We also know that $\text{resistance}_{bulb} = \dfrac{potential\ difference_{bulb}}{current_{bulb}}$

$= \dfrac{1.5\ V}{0.60\ A} = \mathbf{2.5\ \Omega}$.

b) i. energy = power x time
if the power of the circuit is 40 W and it was switched on for 6 minutes, then

energy of the circuit = 40 W x 6 x 60 seconds
= **14400 J**.

ii as we can see, the energy is **directly proportional** to the power. So if we lower the power, we **lower** the **energy** too.