Calculating Current HW

1. A light bulb with a current of 0.8A is left burning for 20min. How much electric charge passes through the filament of the bulb? $Q = \frac{E}{V}$ = $Q = I \times t$ $= 0.8A\,(1200s)$ $= 960\,C$

2. How much electric current is there when 12C of charge pass a point in a circuit in 4.0s?

$I = \frac{Q}{t} = \frac{12C}{4.0s} = 3\,A$

3. What is the current through a light bulb when it takes 24s for 18C of charge to pass through?

$I = \frac{Q}{t} = \frac{18C}{24s} = 0.75\,A$

4. A small electric motor draws a current of 0.40A. How long will it take for 8.0C of charge to pass through it?

$t = \frac{Q}{I} = \frac{8.0C}{0.40A} = 20\,s$

5. How much charge passes through the starting motor, if it takes 4.0s to start a car and there is a current of 225A during that time?

$Q = I \times t$
$= 225A\,(4.0s)$
$= 900\,C$

Calculating Voltage HW

6. A 12V car battery supplies 1.5×10^3C of charge to the starting motor. How much energy is used to start the car? $E = V \cdot Q = 12 \cdot 1.5 \times 10^3 = 180{,}000J$

7. What amount of energy does a kettle use to boil water if it has 800C of charge passing through it with a potential difference of 120V? $E = V \cdot Q = 120 \cdot 800 = 96{,}000\,J$

8. What is the potential difference across a refrigerator if 75C of charge transfers 9.0×10^3J of energy to the compressor motor? $V = \frac{E}{Q} = \frac{9.0 \times 10^3\,J}{75} = 120\,V$

9. A flash of lightening transfers 1.5×10^9J of electrical energy through a potential difference of 5.0×10^7V between a cloud and the ground. Calculate the quantity of charge transferred in the lightning bolt. $Q = \frac{E}{V} = \frac{1.5 \times 10^9}{5.0 \times 10^7} = 30\,C$

10. If a charge of 0.30C moves from one part to another in a conductor and, in doing so, releases 5.4J of electrical energy, what is the potential difference between the two points?

$V = \frac{E}{Q}$
$= \frac{5.4J}{0.30C}$
$= 18\,V$