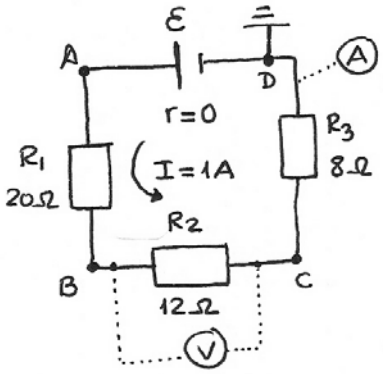
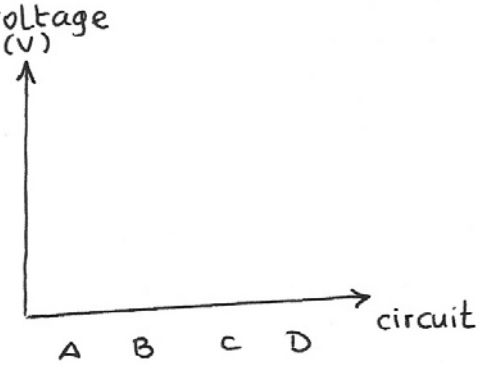
Conceptual Exercise

Complete the graphics related to the electric circuit below:



VOLTAGE



Determination of potentials (voltages)

"D" point is connected to the ground. Therefore, $V_D = 0$ V

From Ohm's Law, we can get the electromotive force of the battery:

$$I = \frac{\varepsilon}{R_{equiv}} = \frac{\varepsilon}{20\ \Omega + 12\ \Omega + 8\ \Omega} = 1\ A \rightarrow \varepsilon = 40\ V$$

"A" point is next to the postive electrode of the battery. It means that $V_A = 40$ V

The potential difference between "A" and "B" (the voltage "lost") is:

$V_A - V_B = I * R = 1\ A * 20\ \Omega = 20\ V$

The potential (voltage) at "B" is:

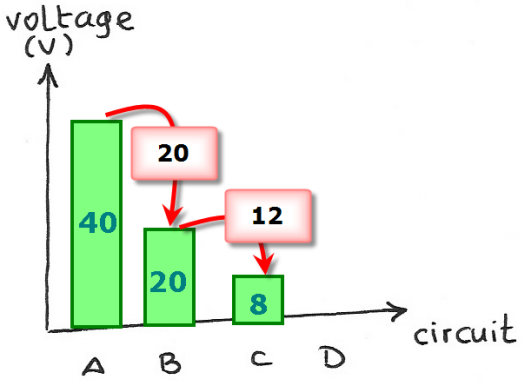
$V_A - V_B = 20\ V \xrightarrow{V_A = 40\ V} 40\ V - V_B = 20\ V \rightarrow V_B = 20\ V$

The potential difference between "B" and "C" is:

$V_B - V_C = I * R = 1\ A * 12\ \Omega = 12\ V$

The potential (voltage) at "C" is:

$V_B - V_C = 12\ V \xrightarrow{V_B = 20\ V} 20\ V - V_C = 12\ V \rightarrow V_C = 8\ V$



Determination of powers

The electric power (energy per second) supplied by the battery is:

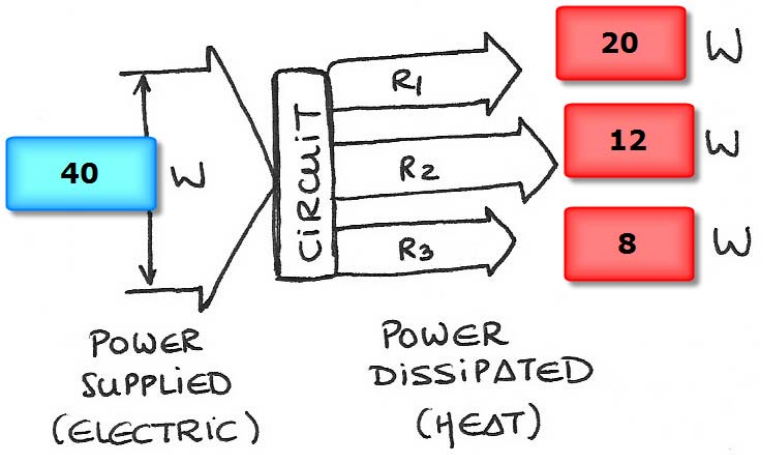
$P_{supplied} = \varepsilon * I = 40\ V * 1\ A = 40\ W$

The power dissipated (as heat) by each resistor is:

$P_{R1} = I^2 * R = (1\ A)^2 * 20\ \Omega = 20\ W$

$P_{R2} = I^2 * R = (1\ A)^2 * 12\ \Omega = 12\ W$

$P_{R3} = I^2 * R = (1\ A)^2 * 8\ \Omega = 8\ W$



Determination of the readings

The reading of the ammeter gives the value of the current. The reading of the voltmeter gives the value of the potential difference between two points: