## Ohm's Law

## $V=I \cdot R$

- V is Voltage, the Potential Difference between two ends of a wire (or resistor, light bulb etc). Measured in Volts [V]
- I is Electric Current, the total charge flowing through the wire in 1 sec . Measured in Amperes [A] (Coulomb per second) : $1 \mathrm{~A}=1 \mathrm{C} / \mathrm{s}$
- $R$ is Resistance of the wire. Measured in Ohms [ $\Omega$ ]. $1 \Omega=1 \mathrm{~V} / \mathrm{A}$



## Serial connection:

Current the same. Voltage adds up.

$$
\begin{aligned}
& I_{\text {total }}=I_{1}=I_{2}=I_{3} \\
& U_{\text {total }}=U_{1}+U_{2}+U_{3}
\end{aligned}
$$


the circuit can be replaced with an single resistor :

$$
R=\frac{U_{\text {total }}}{I_{\text {total }}}=R_{1}+R_{2}+R_{3}
$$

## Parallel connection:

Voltage the same. Current adds up.

$$
\begin{aligned}
& U_{\text {total }}=U_{1}=U_{2}=U_{3} \\
& I_{\text {total }}=I_{1}+I_{2}+I_{3} \\
& \frac{1}{R}=\frac{I_{\text {total }}}{U_{\text {total }}}=\frac{1}{R_{1}}+\frac{1}{R_{2}}+\frac{1}{R_{3}}
\end{aligned}
$$



## Homework

a) Find the equivalent resistance and current in the circut.
b) Determine voltage on the 50 Ohm resistor, and the current running through it:

c) You need to replace one of the resistors in the circuit above with a light bulb, so that the current through the bulb were the smallest possible. Which one will you replace?

