Voltage Divider and Current Divider Circuits

Resistors are usually used to adapt the voltage or the current according to the specifications of other devices in the circuit. A good understanding of voltage and circuit divider circuits allows us to predict the currents flowing in different parts of a circuit with minimum effort.

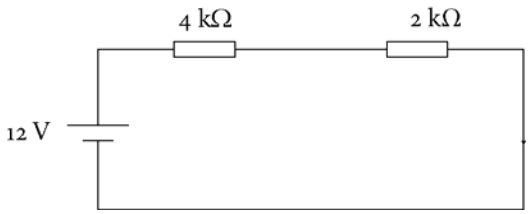
Voltage Divider

The current flowing through two (or more) resistors in series has the same magnitude in all of them. Using Ohm's law, it follows that the ratio of the partial voltages across the resistors is

$$\frac{\Delta V_1}{\Delta V_2} = \frac{R_1 \cdot I}{R_2 \cdot I} = \frac{R_1}{R_2}.$$

The voltages across resistors in series wiring vary as their resistances.

Example: In the circuit below, the voltage across the 4 kΩ resistor is 8 V (two parts) and the voltage across the 2 kΩ resistor is 4 V (one part).



Current Divider

The voltage across two (or more) resistors in parallel is the same for all of them. With Ohm's law we find that

$$\frac{I_1}{I_2} = \frac{\Delta V / R_1}{\Delta V / R_2} = \frac{R_2}{R_1}.$$

The currents through resistors in parallel wiring vary inversely as their resistances.

Example: In the circuit below, the current through the 15 kΩ resistor is 6 mA (one part) and the current through the 5 kΩ resistor is 18 mA (three parts).