Combinations of Resistors

1. Series Connection (single path)

$$R_{\text{eq}} = \sum_{k=1}^{N} R_k$$

- In series, all resistors have the <u>same</u> **current**, including with the equivalent current
- In series, the **voltages** <u>add up</u> to the equivalent/total voltage

$$V_{\text{total}} = V_{\text{eq}} = \sum_{k=1}^{N} V_k$$

2. Parallel Connection (multiple paths)

$$\frac{1}{R_{\text{eq}}} = \sum_{k=1}^{N} \frac{1}{R_k}$$

- In parallel, all resistors have the <u>same</u> **voltage**, including with the equivalent charge
- In parallel, the **currents** <u>add up</u> to the equivalent/total current

$$I_{\text{total}} = I_{\text{eq}} = \sum_{k=1}^{N} I_k$$