## **Combinations of Resistors**

1. Series Connection (single path)

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

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

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

2. Parallel Connection (multiple paths)

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

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

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