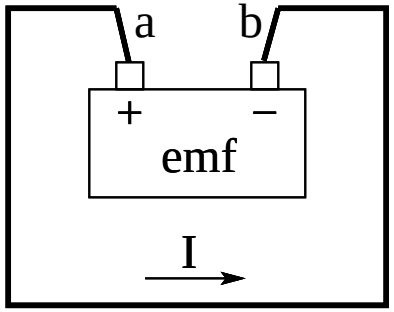
Direct Current Circuit

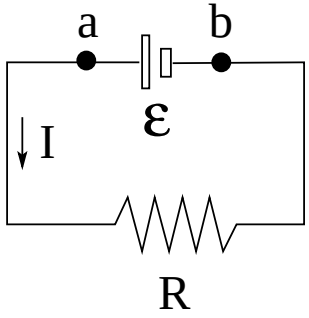
Consider a wire with resistance $R = \rho\ell/A$ connected to a battery.

- **Resistor rule**: In the direction of I across a resistor with resistance R, the electric potential drops: $\Delta V = -IR$.
- **EMF rule**: From the $(-)$ terminal to the $(+)$ terminal in an ideal source of emf, the potential rises: $\Delta V = \mathcal{E}$.
- **Loop rule**: The algebraic sum of the changes in potential encountered in a complete traversal of any loop in a circuit must be zero: $\sum \Delta V_i = 0$.

physical system



circuit diagram



electric potential