Batteries

- Have internal resistance →
  usually $< 5\Omega$

- When internal resistance increases, battery cannot produce as much current.

Voltmeters

- Measure ACROSS a piece (this is in parallel)

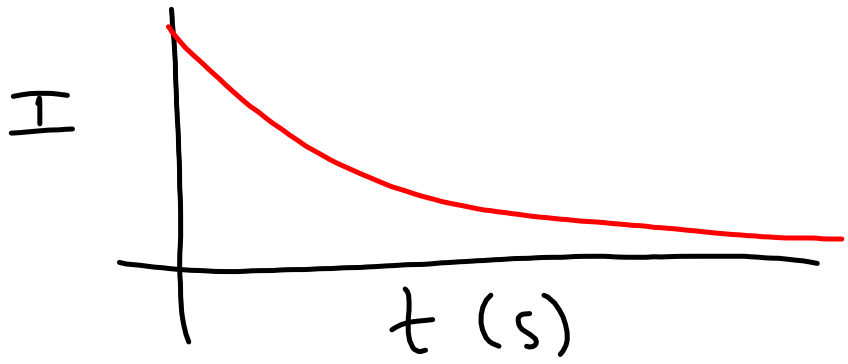
← Resistance is HIGH (order of 1 million ohms)

We don't want current in voltmeter, otherwise we blow the fuse

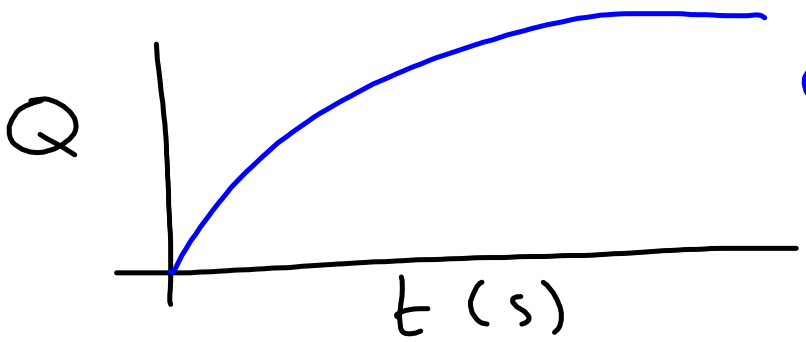
Ammeter

↑ Resistance is LOW
(less than 10Ω)

Charging/Discharging

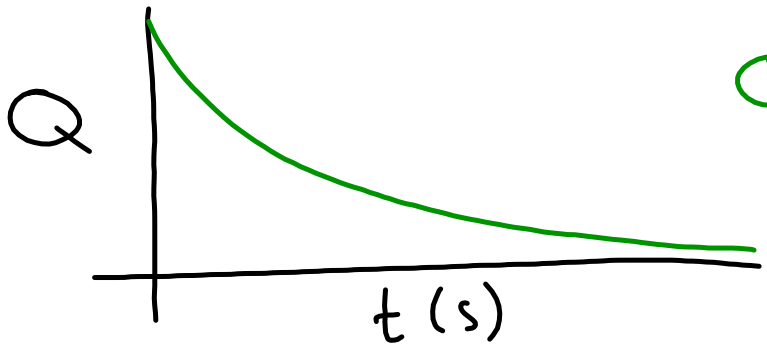


Charging



$$Q = CV\left(1 - e^{-t/RC}\right)$$

Discharging → RC only (no battery)



$$Q = Q_0 e^{-t/RC}$$

$$Q = q_1 + q_2 + \cdots$$

(for "closed" circuit)