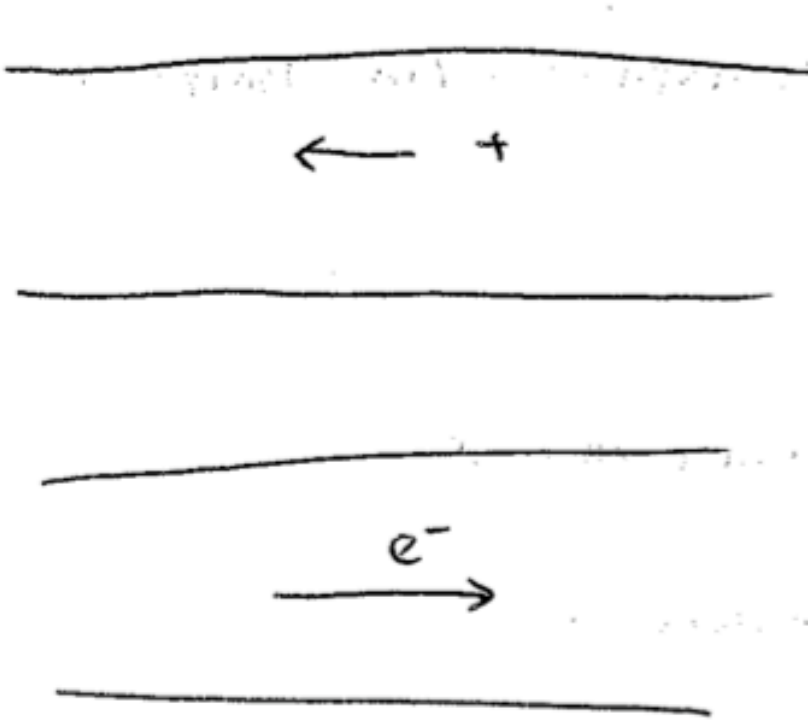
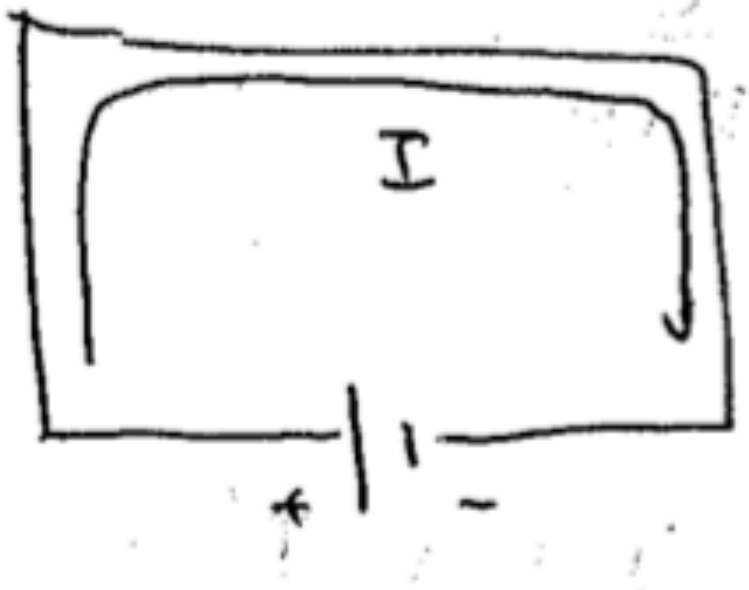
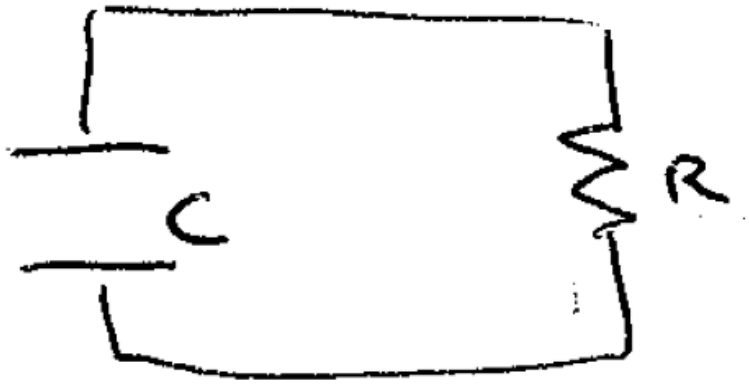
Direction of current



Convention assumes positive charges



RC circuit

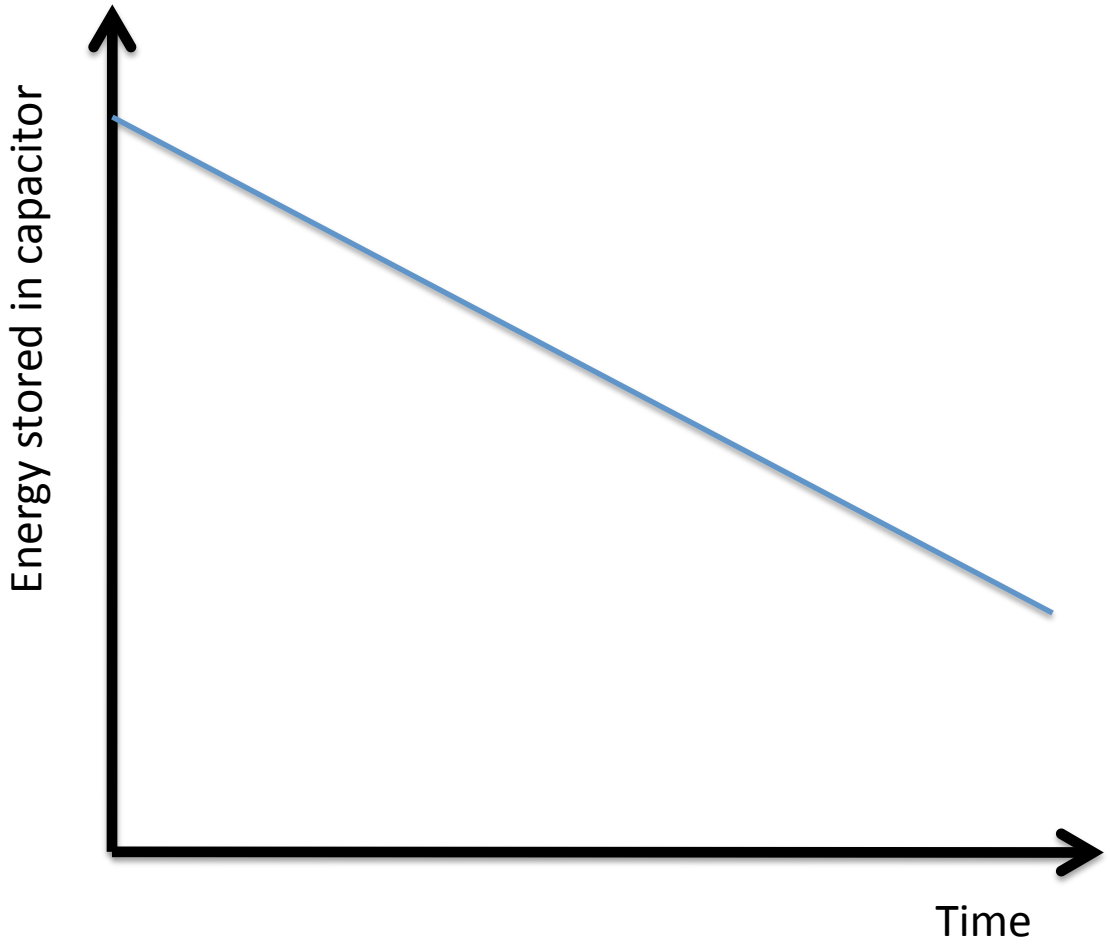


$C = 100\ \mu F$

Initially, voltage across the capacitor is 10 volts and it discharges

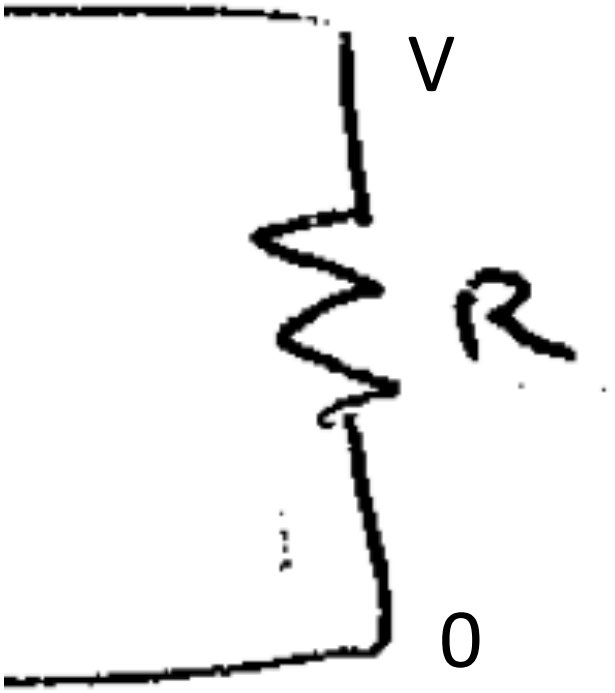
Initial energy stored is $\frac{1}{2}CV^2$

Board calculation

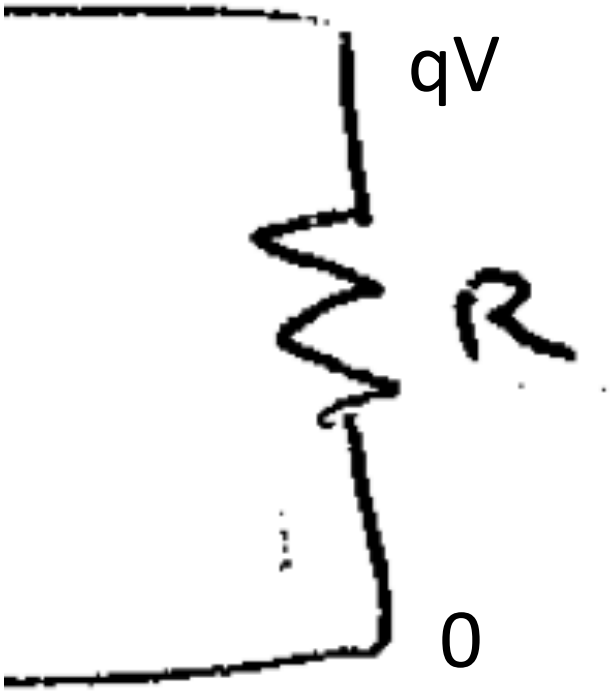


Power: rate of energy dissipated in circuit

Potential drop across the resistor



Potential energy drop across the resistor

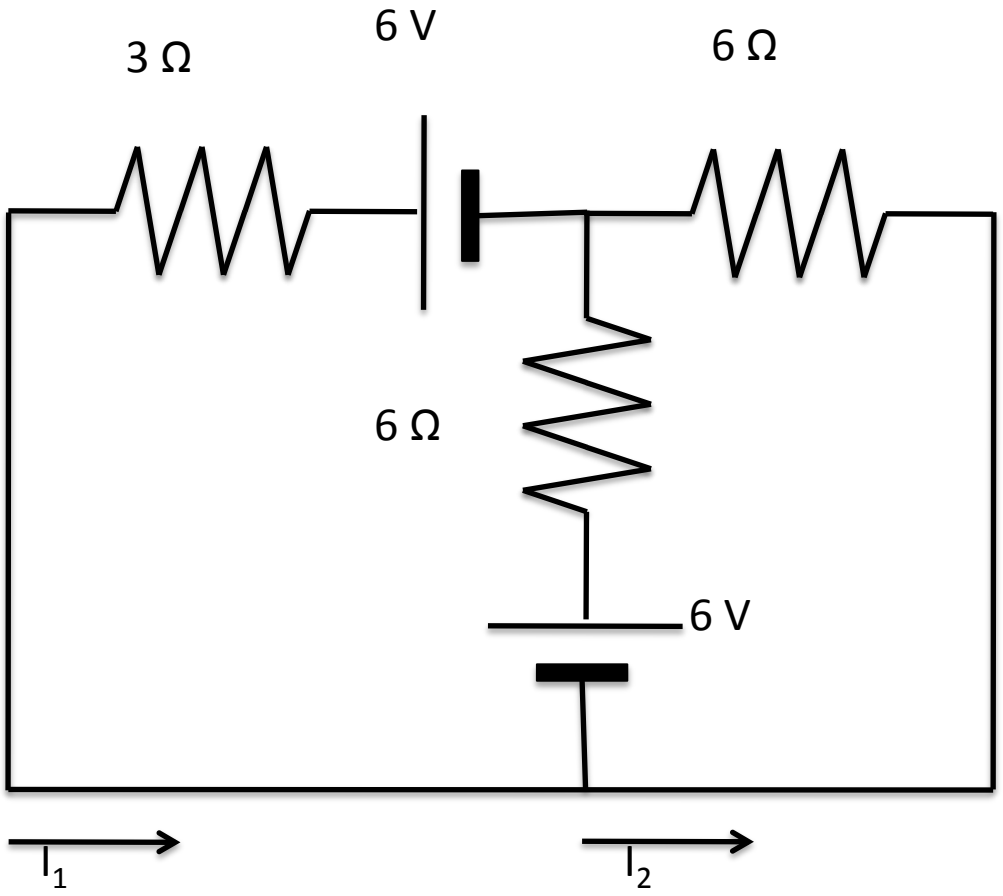


If voltage is held constant, rate of energy dissipation is

$$\frac{d(qV)}{dt} = V\frac{dq}{dt} = IV = P$$

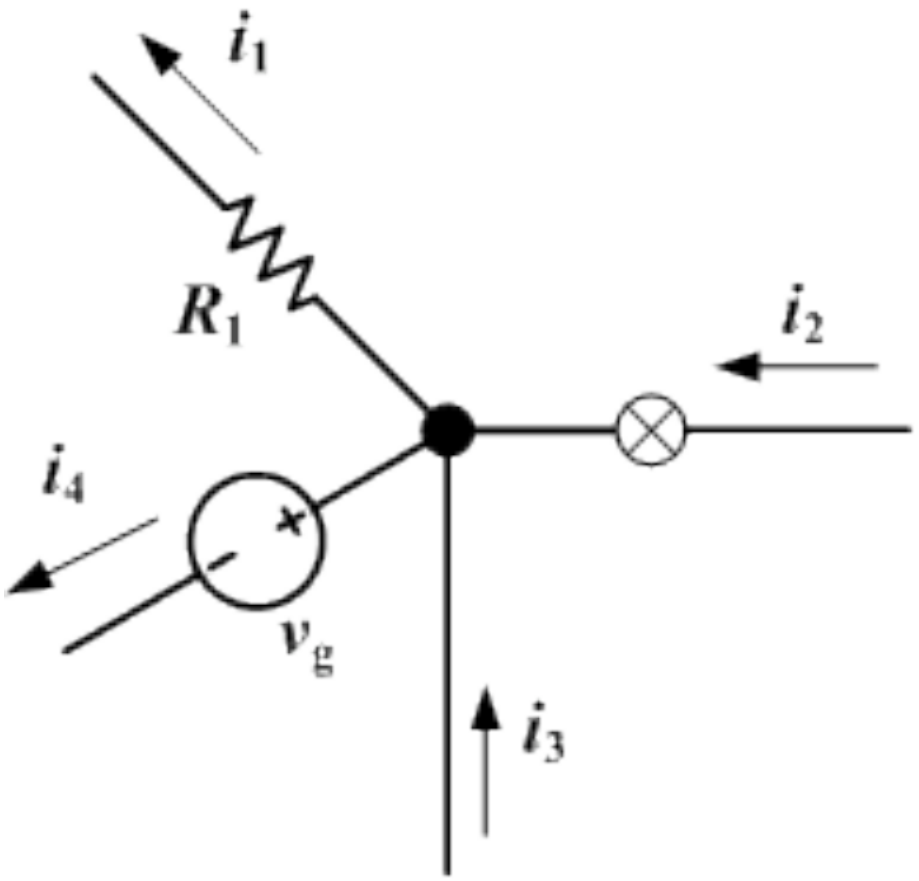
P: power [J/s], Watt

How do we understand behaviors of complex circuits?



Kirchhoff's Law

1. Conservation of Charge



Kirchhoff's Law

2. Conservation of Energy

$$\sum_{ClosedLoop} \Delta V = 0$$