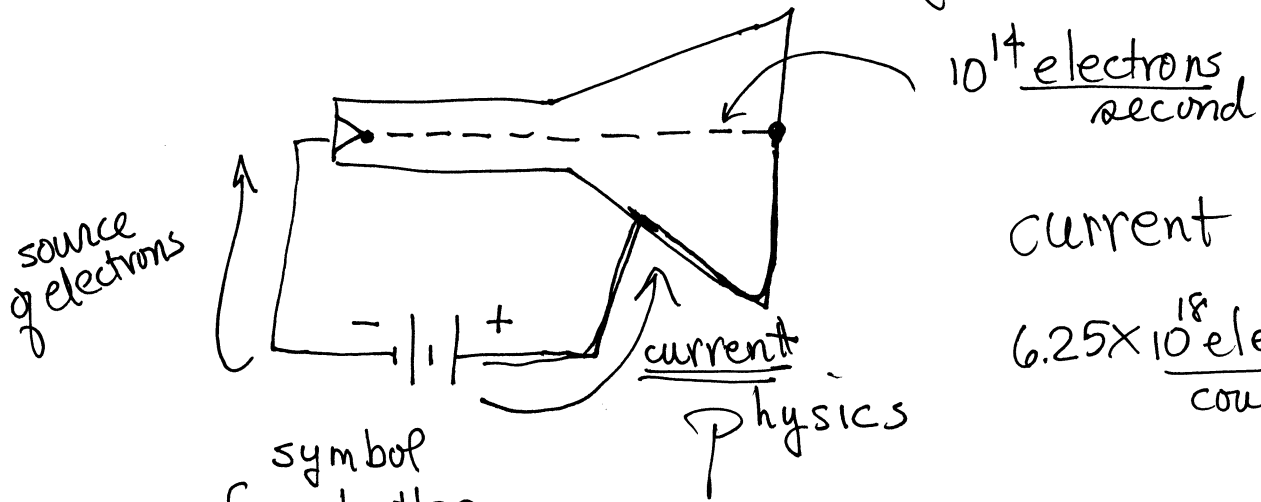


CRT cathode ray tube



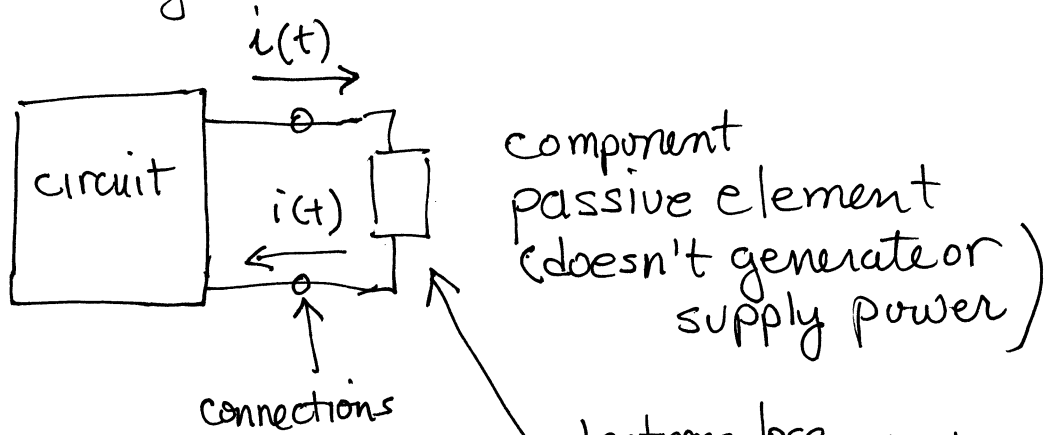
symbol
for a battery
50,000 volts
 50×10^3
50 kV

$$\frac{10^{14} \text{ electrons}}{\text{sec}} \times \frac{1 \text{ coul}}{6.25 \times 10^{18} \text{ electrons}}$$

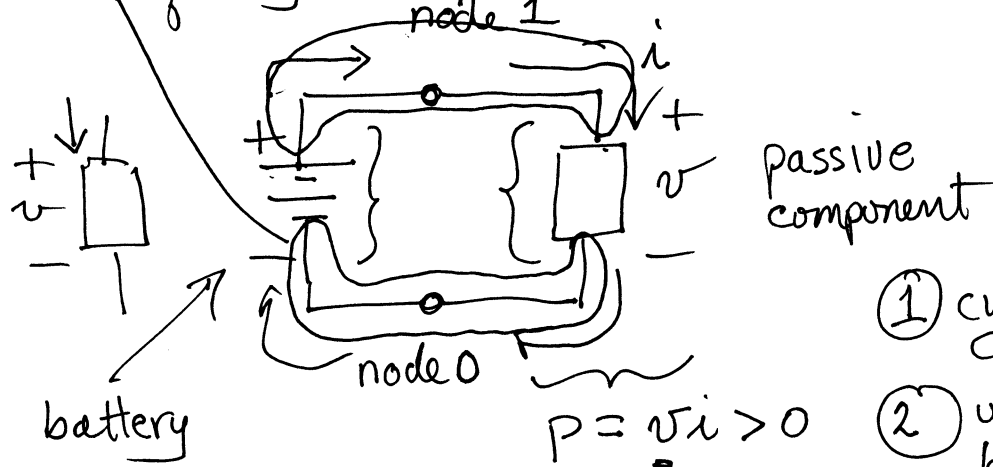
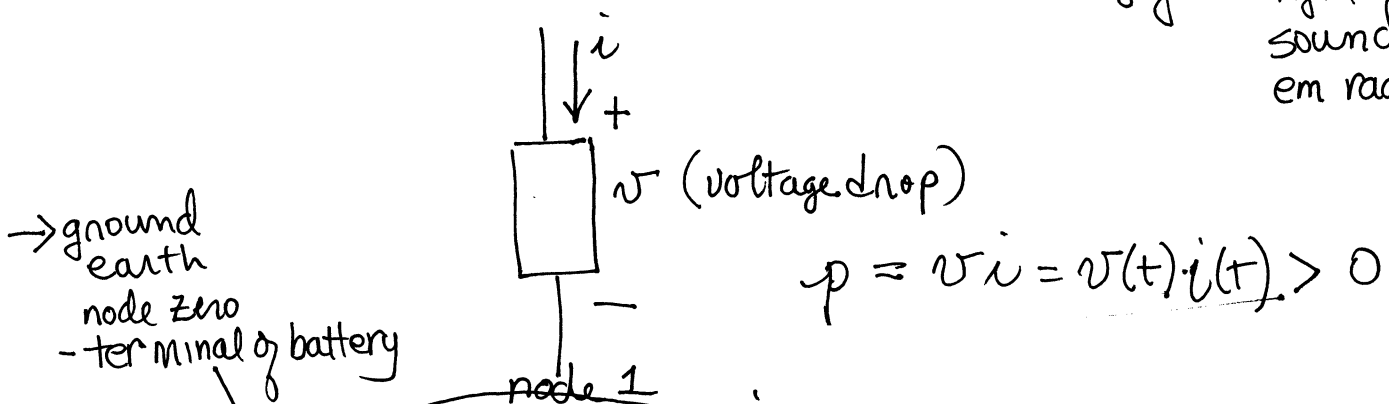
$$\frac{10^{14}}{6.25 \times 10^{18}} \frac{\text{coul}}{\text{sec}} = \frac{1}{6.25} \times 10^{-4} \text{ A.}$$

$$\text{power} = v i = (50 \times 10^3) \left(\frac{1}{6.25} \times 10^{-4} \right) = 0.8 \text{ watts}$$

passive sign convention



electrons lose energy → heat
light
sound
em radiation



- ① current doesn't change
- ② voltage across battery = voltage across passive element

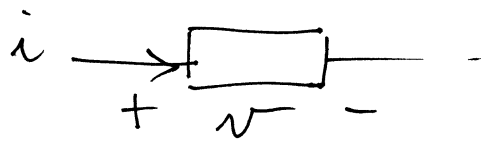
$\phi = v i$
 $p = v(-i) = -v i < 0$
source of power

o mechanical/electrical connections

• "

node

electrical
~~Passive~~ component
(passive sign convention)



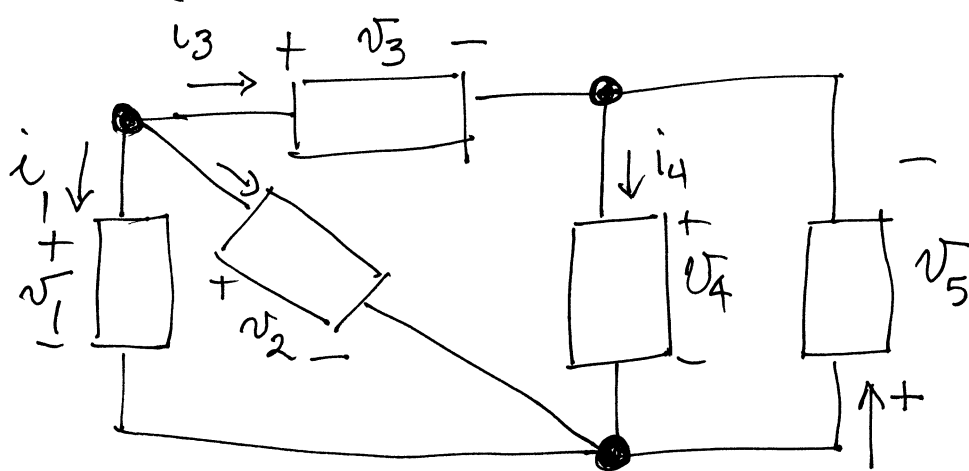
$$v = 5 \text{ volts} \\ i = 1 \text{ amp} \quad p > 0$$

$$v = -3.47 \text{ volts} \quad p < 0 \\ i = 2 \text{ amp.}$$

$$v = +3.5 \text{ volts} \quad p < 0 \\ i = -0.01 \text{ amp}$$

$$v = -2 \text{ v} \quad p = +6 > 0 \\ i = -3 \text{ A}$$

Example 1-3



v Device
 +100 V
 i
 P -1 watt

$$\begin{aligned}
 p &= v i \\
 -1 &= (+100) i \\
 i &= \frac{-1}{100} = -0.01 \text{ A} \\
 &= -1 \times 10^{-2} \text{ A} \\
 &= -10 \times 10^{-3} \text{ A} \\
 &= -10 \text{ milli Amps}
 \end{aligned}$$