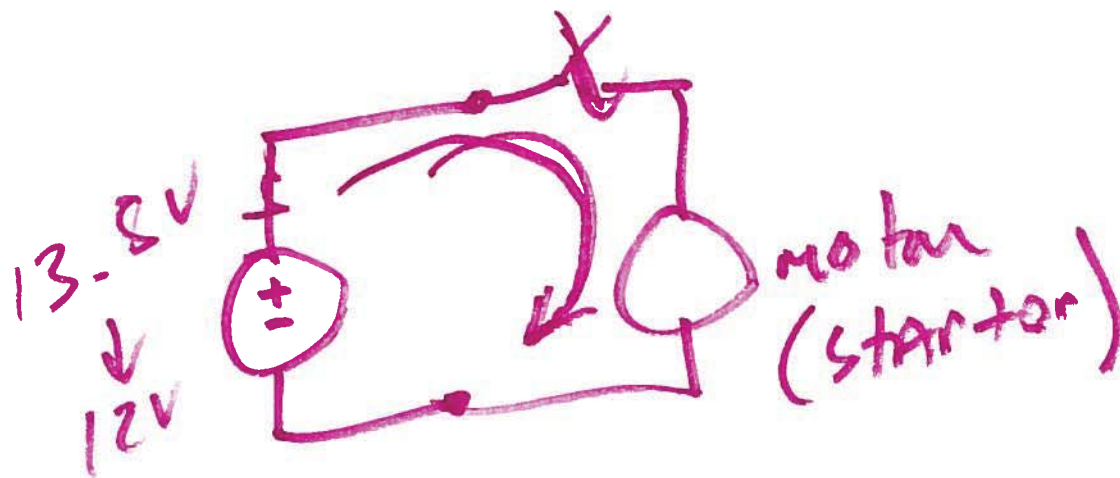


EE220

Lecture 10

Circuits I



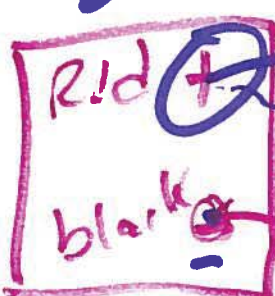
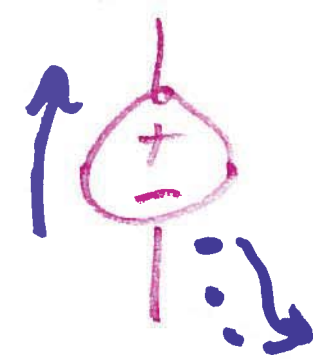
Leave running

Dead battery

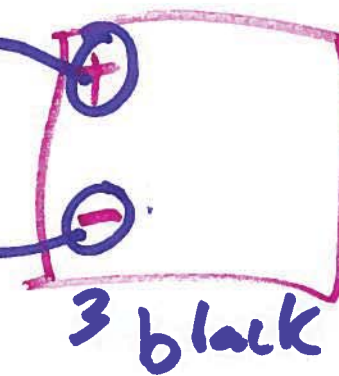
Good battery
Good battery
red red

Switch

Dead, red



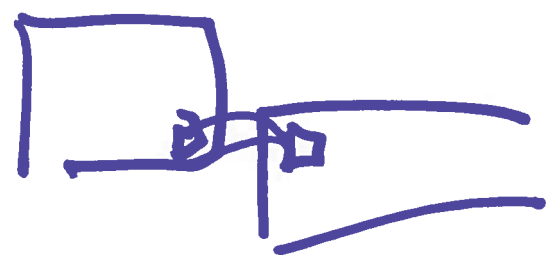
Black
chassis



12V
12

1204 A

electrons need
a place to go



POWER ~ dissipative

ENERGY \Rightarrow Joules
POWER \Rightarrow WATTS

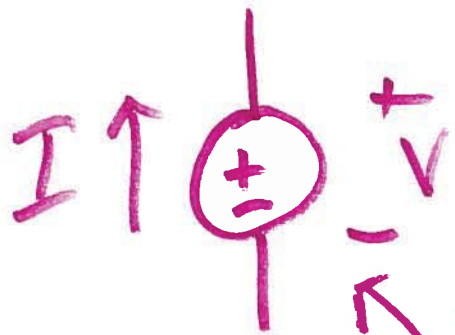
$$I = \frac{V}{R}$$

$$V = IR$$

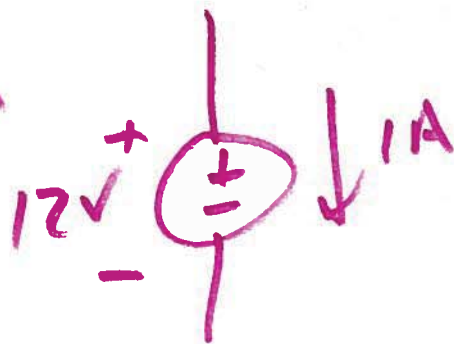
$$\text{Power} = I \cdot V$$

$$\text{WATT} = \frac{\text{Joule}}{\text{s}} = \frac{V^2}{R} = I^2 \cdot R$$

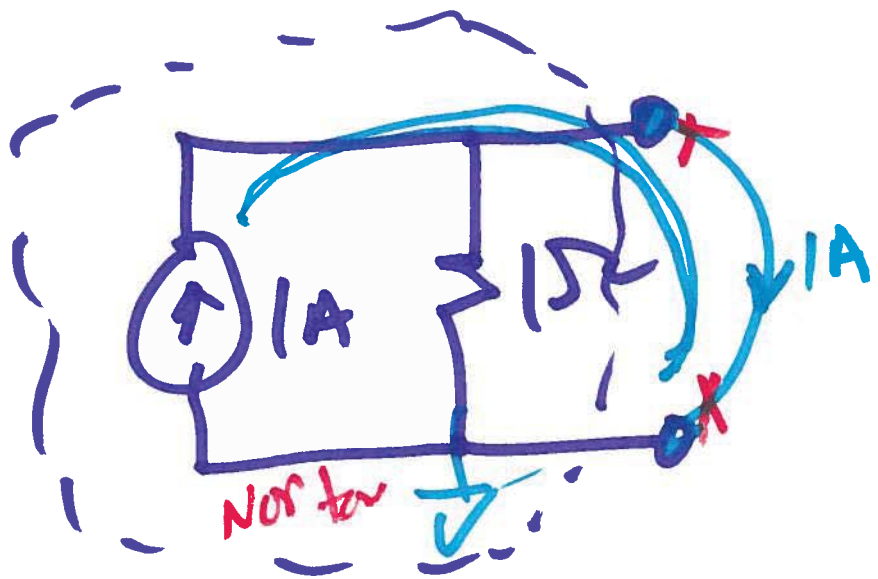
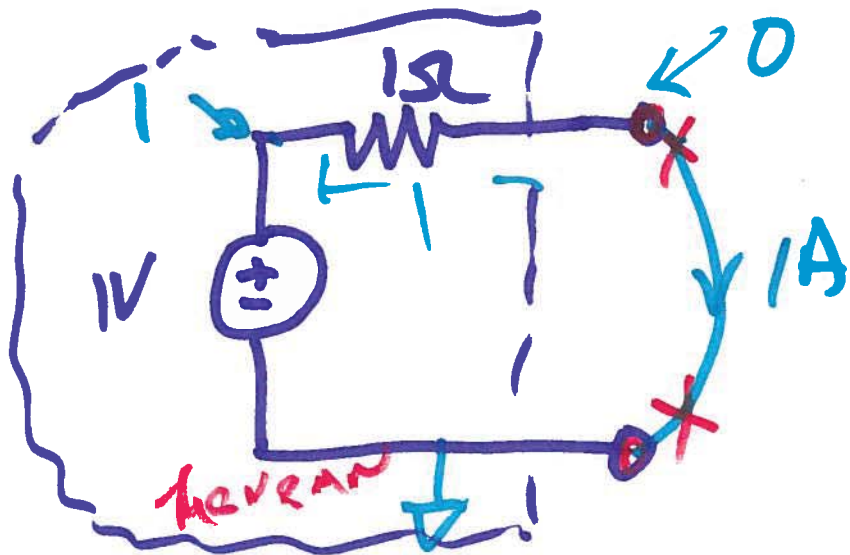
1.5V
5mA·hr



Negative resistor



3)

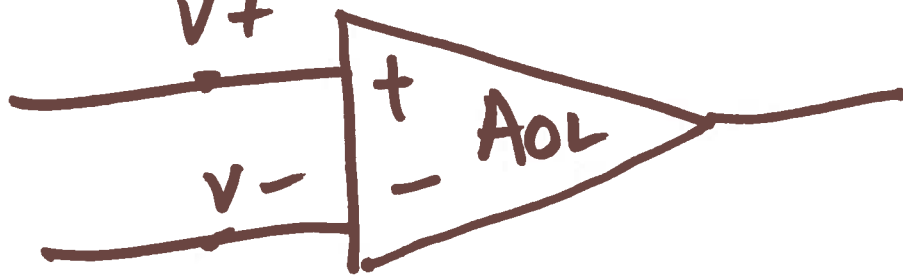


4)

Operational Amplifiers

OP - AMP

+ or non-inverting terminal



- or inverting terminal

Ideal op-amp

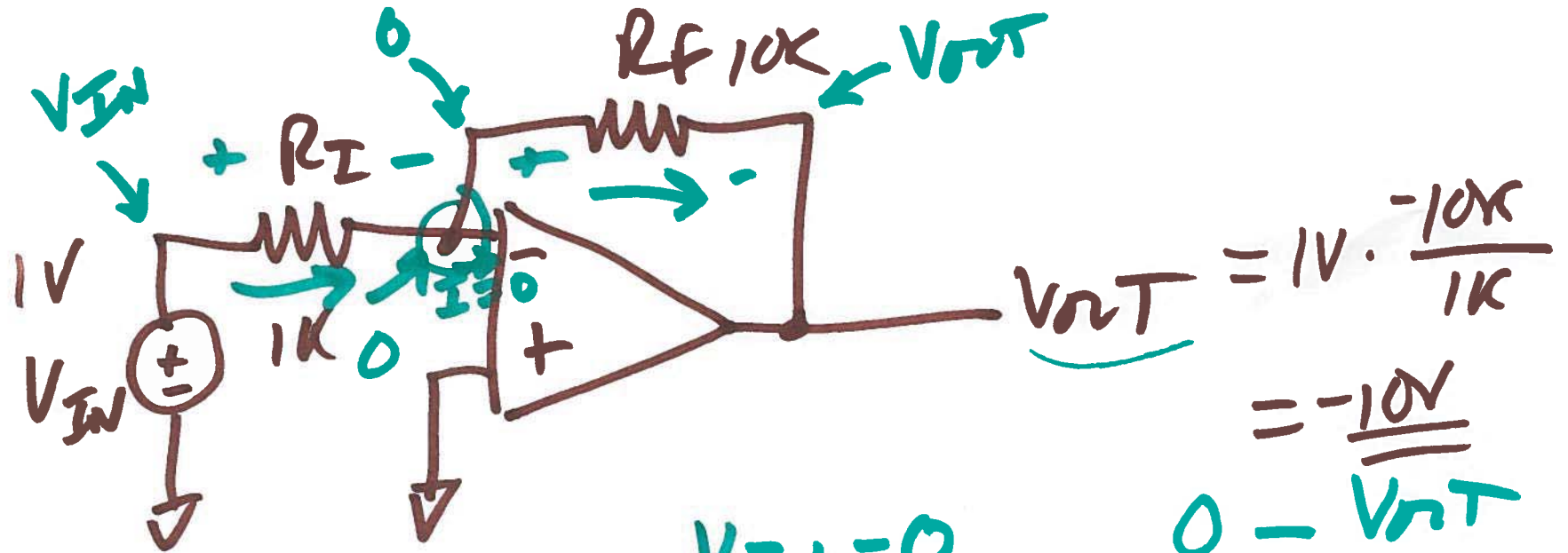
$$V_{OUT} = A_{OL} \cdot (V_+ - V_-)$$

1) Assume $V_+ = V_-$

2) KCL at the - input

6)

Inverting op-amp topology



$$\frac{V_{IN} - 0}{R_I} = \frac{0 - V_{OUT}}{R_F}$$

$$\boxed{G_{AIN} = \frac{V_{OUT}}{V_{IN}} = -\frac{R_F}{R_I}}$$

