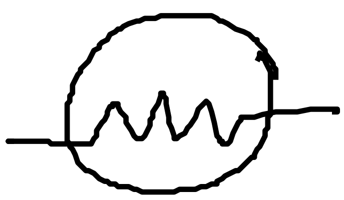
Schematic Circuit Diagrams

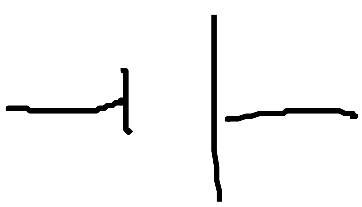
wire
(ideal wire: $R=0$)

$4\,\Omega$

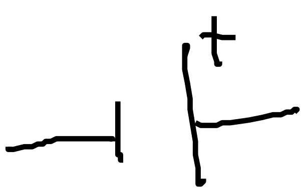
resistor
(ohmic: R = constant)



light bulb



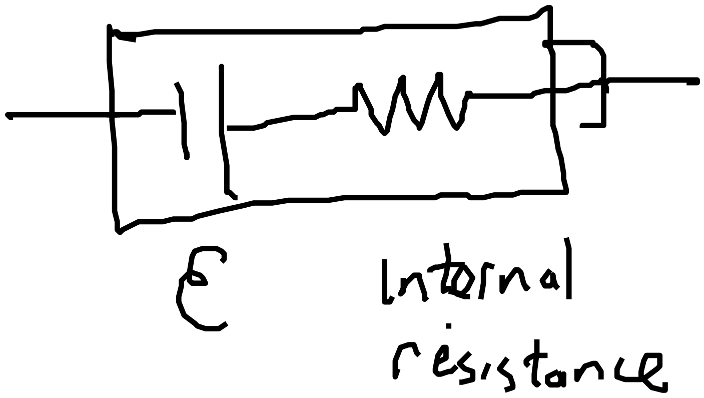
battery or power supply



$\mathcal{E} = 12\,V$

emf: potential difference across battery

Real battery



ASIDE FOR NOW

Ground!

we can call any one spot

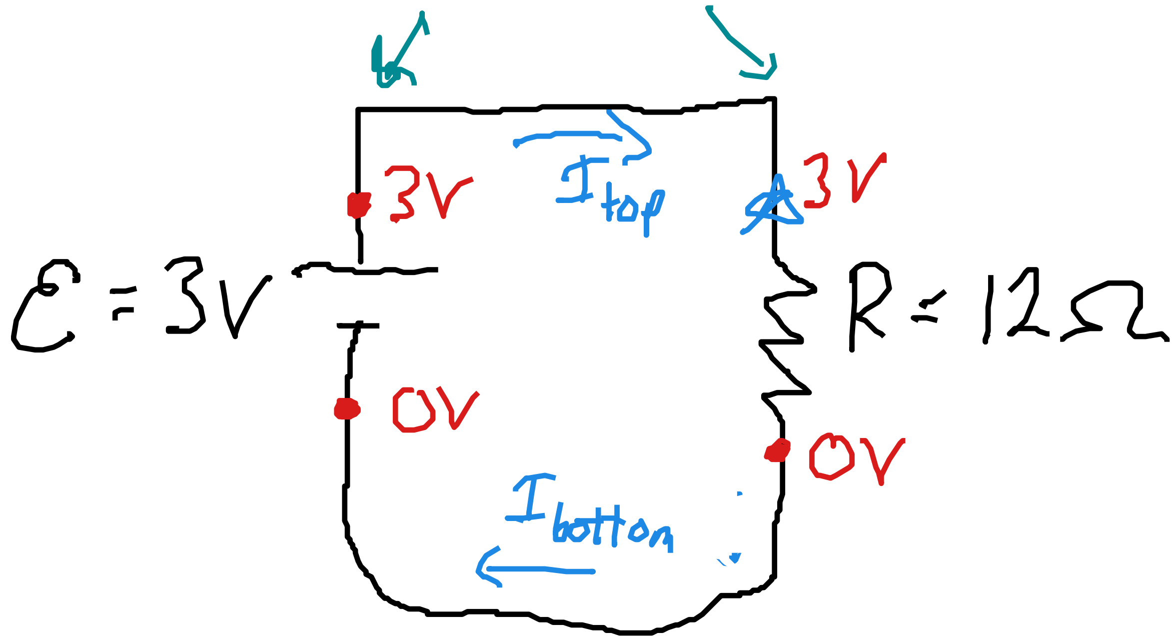
on a circuit "$V=0$"

(only ΔV matter)

In practice, ground also refers

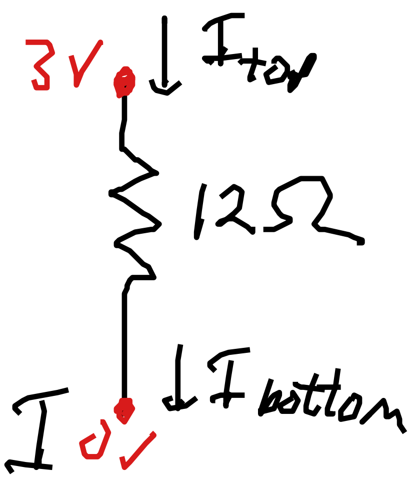
to the potential of passers-by

$\Delta V = IR = I(0) = 0$



Every point on an ideal wire has the same potential.

Current is conserved



$I_{top} = I_{bottom} = I$

$\Delta V = IR$

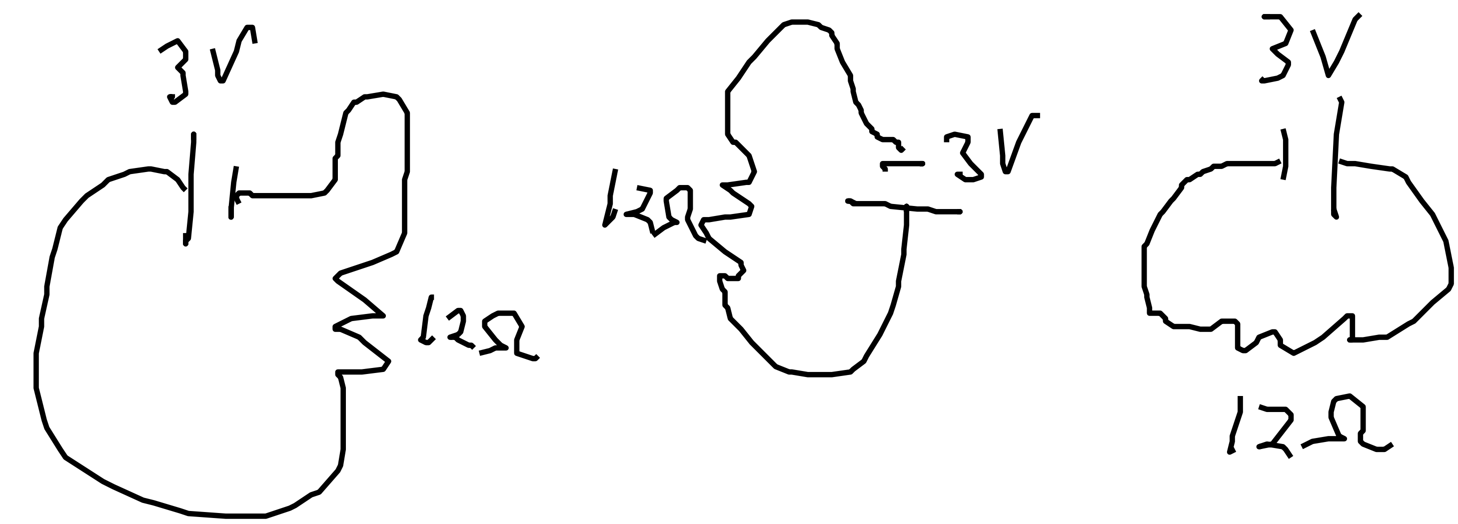
$3 = I(12)$

$\boxed{0.25A = I}$

Current is not "used up" by resistor.

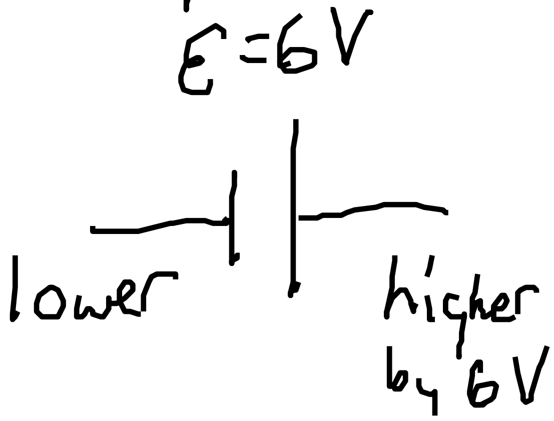
Current is a carrier for energy

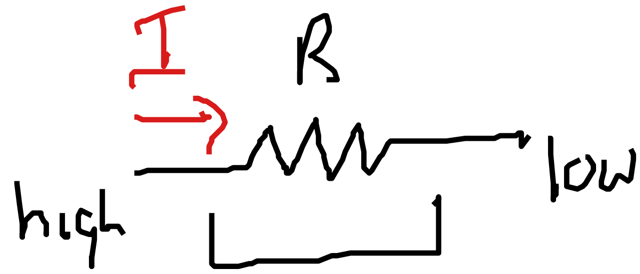
Geometry doesn't matter



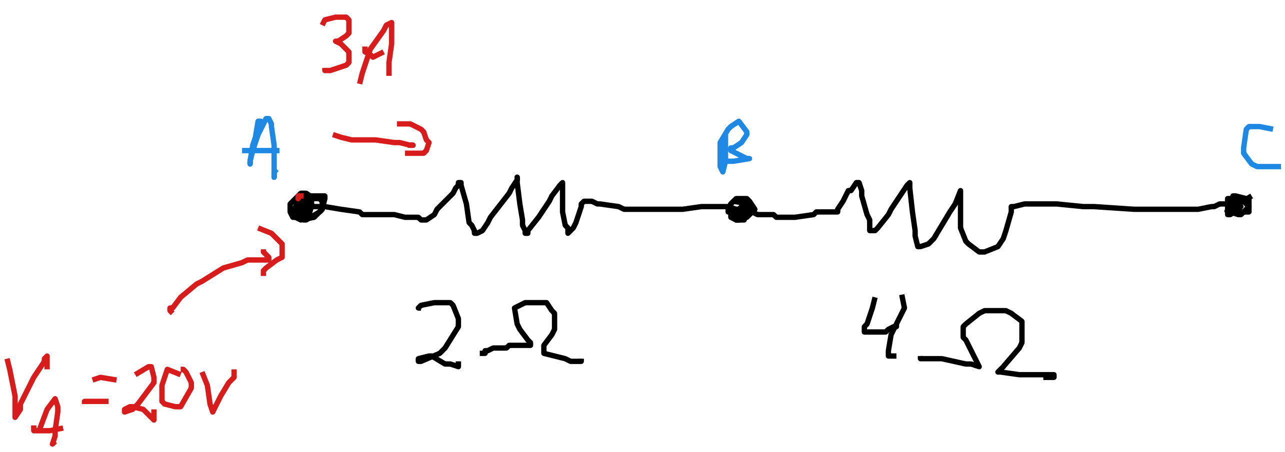
Connections matter

Batteries & resistors involve potential changes

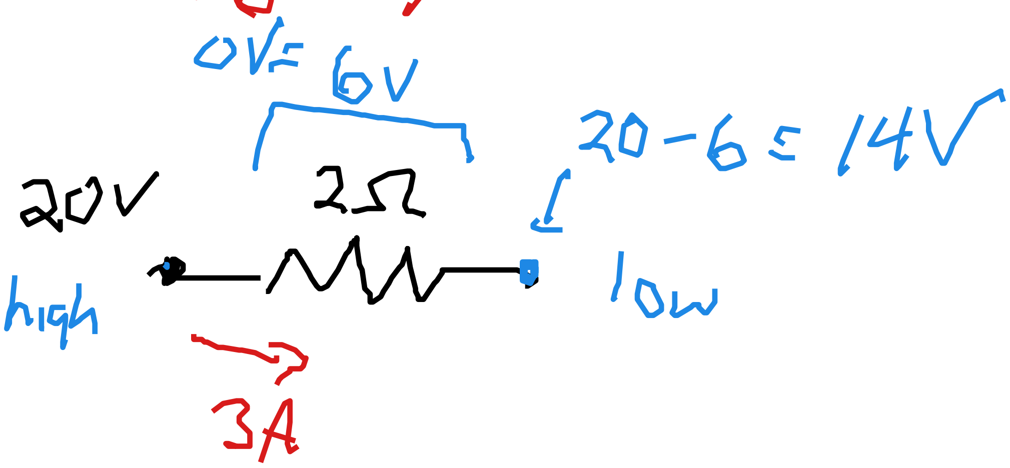




$\Delta V = IR$



$V_B = ?$



$\Delta V = IR = (3A)(2\Omega) = 6V$

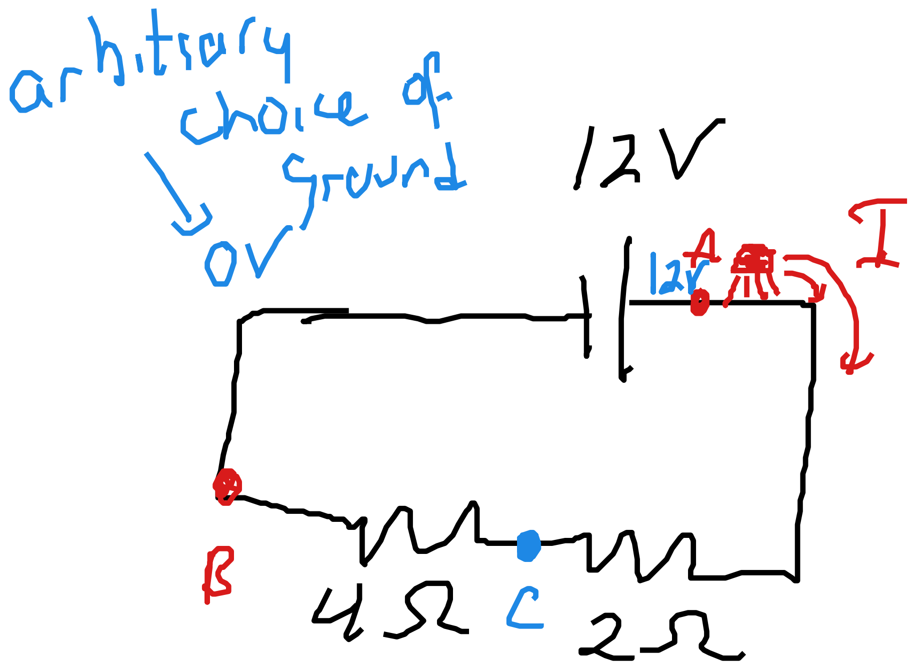
What is potential at C?

$14 - 12 = 2V$

$\Delta V = 12V = (3)(4)$

Tally Method

- Start at point A
- Move towards point B, keeping track of ΔV along way
- $\Delta V = V_B - V_A$ = total tally of changes



$$-I(2)$$
$$-I(4)$$

$$V_B - V_A = -6I$$

$$V_B = V_A - 6I$$

if $V_B = 0$

$V_A = 12$

$$0 = 12 - 6I$$

$$I = 2A$$

V_c

$$\frac{12 - 2(I)}{V_c}$$

$12 - 2I = V_c$

$12 - 2(2) = V_c$

$8 = V_c$