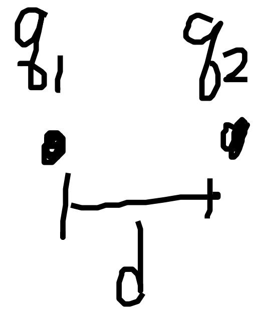
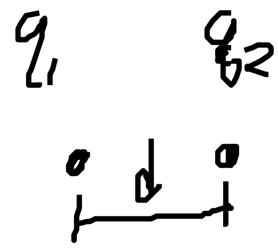
force $F = k \frac{|q_1 q_2|}{d^2}$



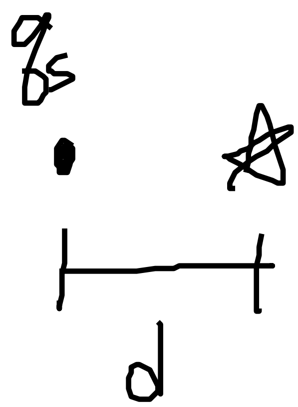
N

energy $PE = k \frac{q_1 q_2}{d}$



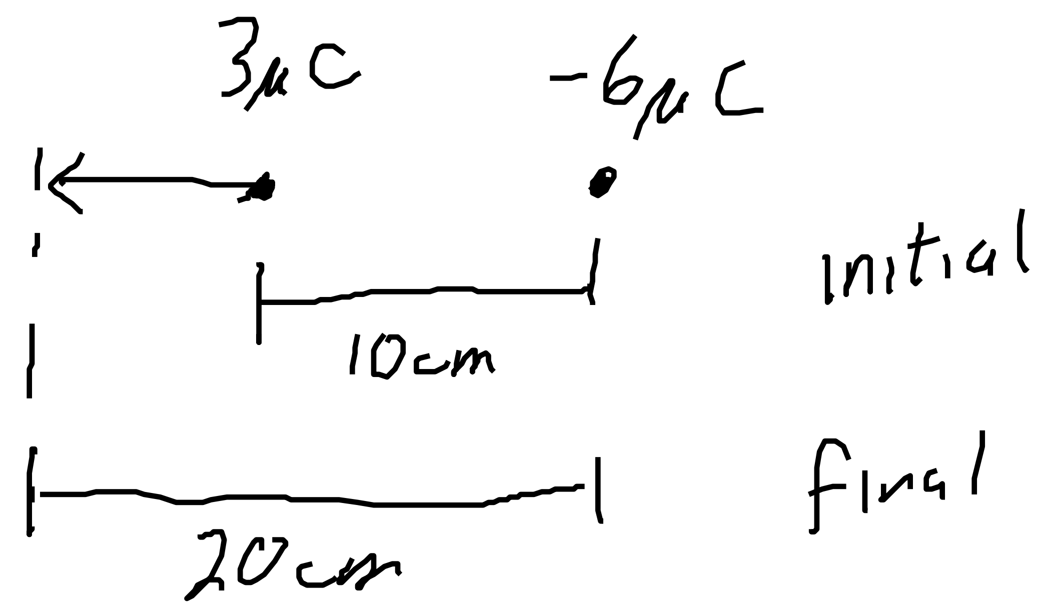
J

$V = k \frac{q_s}{d}$



V

HW7 #2



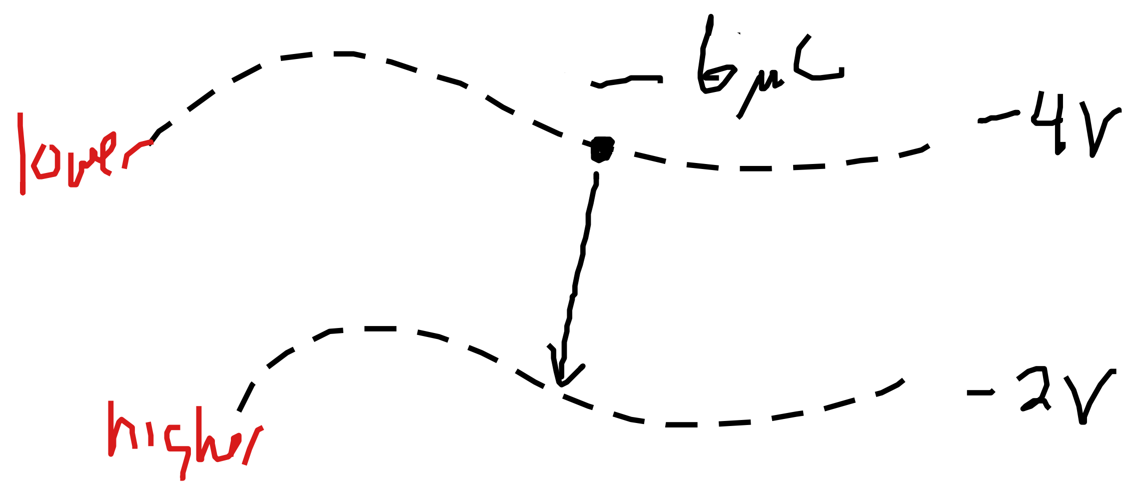
What is change in PE?

$$\Delta PE = PE_f - PE_i$$

$$PE_i = (9\times10^9)\frac{(3\times10^{-6})(-6\times10^{-6})}{(10\times10^{-2})} = -1.6J$$

$$PE_f = (9\times10^9)\frac{(3\times10^{-6})(-6\times10^{-6})}{(20\times10^{-2})} = -0.8J$$

$$\Delta PE = (-0.8) - (-1.6) = -0.8 + 1.6 = +0.8J$$



$$\Delta PE = q_T \Delta V$$

$V_f - V_i$

$$\Delta PE = (-6\times10^{-6})((-2V)-(-4V))$$

$$= (-6\times10^{-6})(-2+4)$$

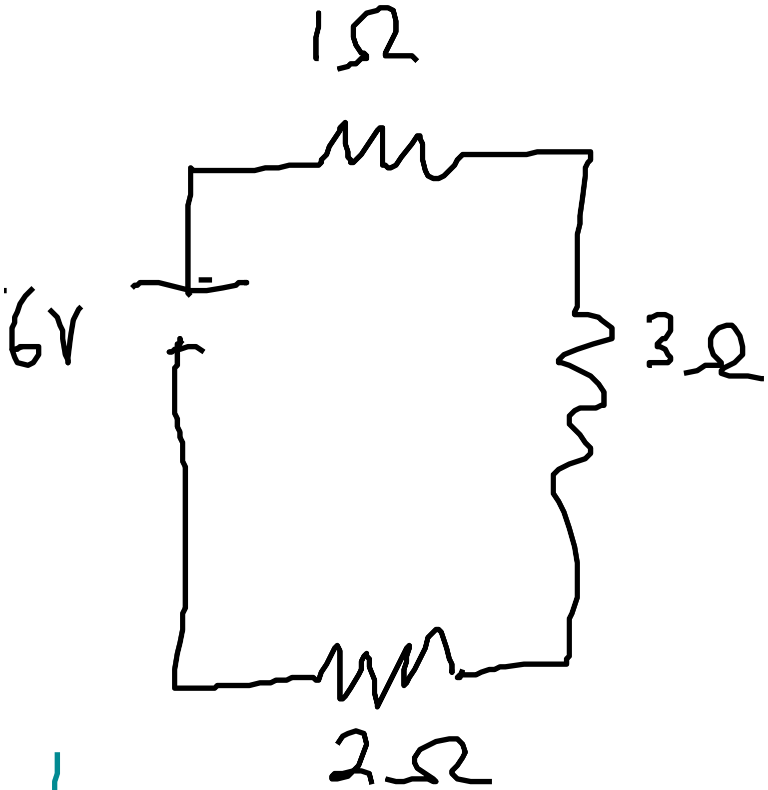
$$= -12\times10^{-6}\,J$$

$$= -12\,\mu J$$

:)

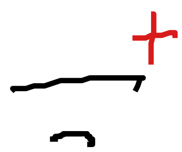
negative charges like going uphill

Schematic Diagrams

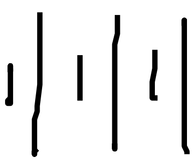


=

longer line = +



battery / power supply



"emf" ε of battery
potential difference across the battery

3 Ω

resistor

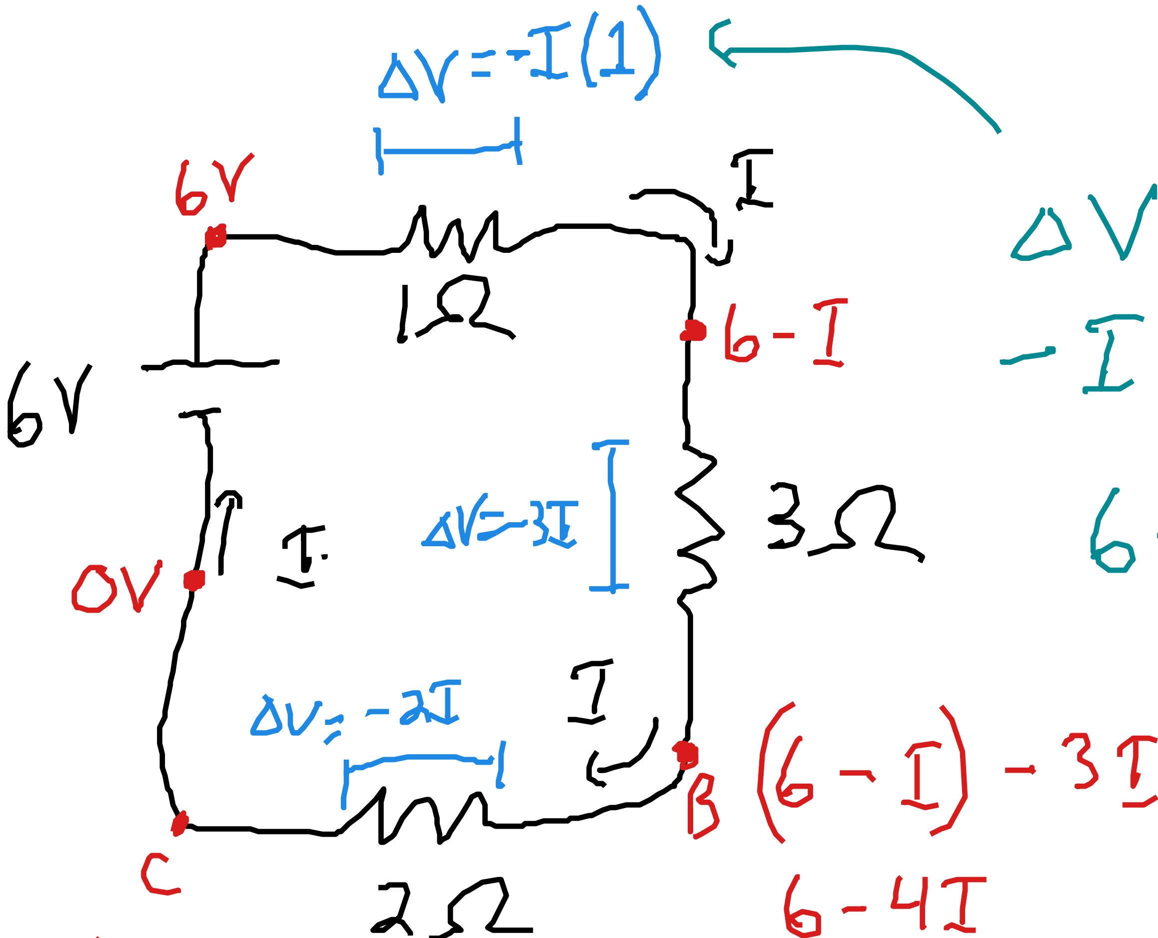
wire

(R = 0)

V is same everywhere along the wire

Shape doesn't matter; the connections do.

Ohm's Law
$\Delta V = IR$



$\Delta V = V_f - V_i$

$-I = V_f - 6$

$6 - I = V_f$

$(6-4I)-2I$

$6-6I$ but also 0

There's only one current where

$6 - 6I = 0$ & we avoid a contradiction

$\rightarrow 6 = 6I \rightarrow I = 1A$

$$P = I\Delta V = I^2 R$$

6V battery supplies $P = (1A)(6V) = 6W$

1Ω resistor takes $P = (1A)^2(1\Omega) = 1W$

3Ω takes 3W

2Ω takes 2W

resistors take 6W

battery supplies 6W

} consistent