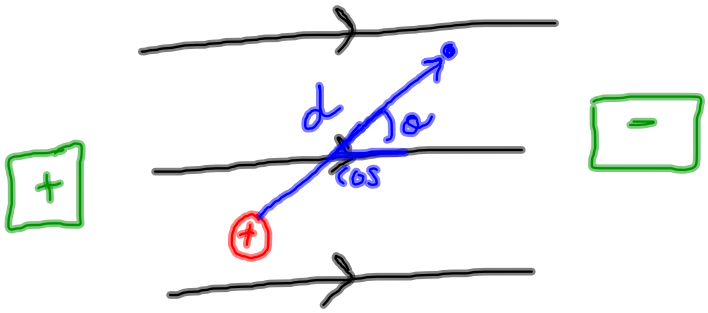
- When work is (+), PE is (-)

  ie: moving to an area of lower PE

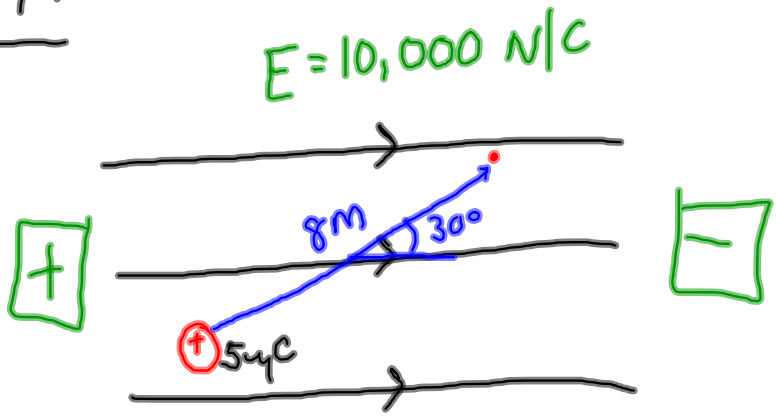
- When work is (-), PE is (+)

  ie: moving to area of high PE



$$W = qEd\cos\theta$$

Ex 1:



a) What is the work done the particle?

$$W = qEd\cos\theta$$
$$= (5E{-}6)(10000)(8)\cos 30$$
$$= 0.35\ J$$

b) What is the change in PE of the particle?

$$-W = PE$$
$$-0.35 = PE$$

Ex 2:

A uniform field of magnitude 5000 N/C points due East. A 5 μC charge is moved 5m due East. Find the work done on the charge and the change in the potential energy.

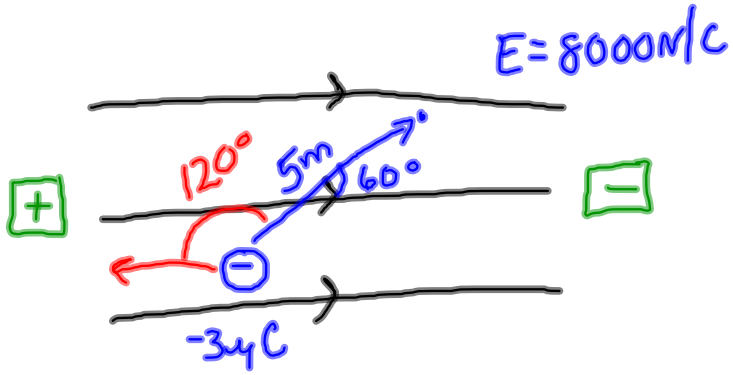
$$W = qEd\cos\theta$$

$$= (5E\text{-}6)(5000)(5)\cos 0$$

$$= 0.125\ J$$

$$\Delta PE = -0.125\ J$$

Ex 3:



$W = ?$

$= qEd\cos\theta$

$= (3\epsilon{-}6)(8000)(5)\cos 120$

$W = -0.06\,J$

$\Delta PE = ?$

$\Delta PE = +0.06\,J$

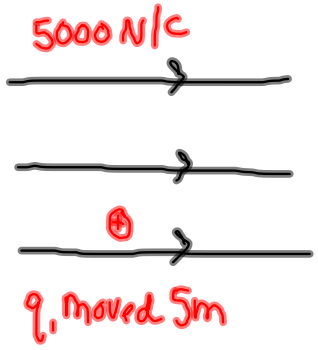
θ determinz the sign of W

$0 \leq \theta \leq 90$ = (+) W
(-) PE

$90 < \theta \leq 180$ = (-) W
(+) PE

When a (+) or (-) charge is released (free to move) in an electric field, it will move in such a way that the Work done will be (+) and the change in electric potential energy will be NEGATIVE.

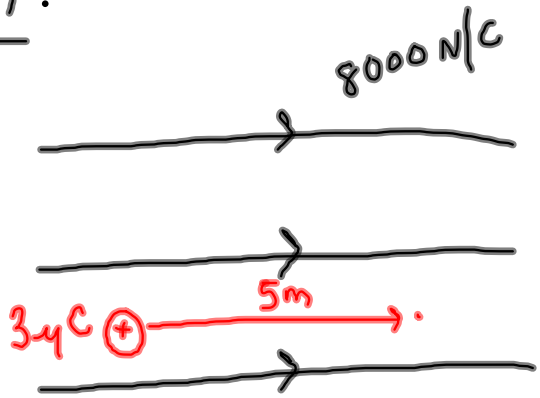
Electric Potential: The work done to move a positive charge from infinity to that point.



Assume $V_{@\infty} = 0$

$$V = -Ed$$
$$= -5000(5)$$
$$= -25000\ V$$

Ex 4:



1) Find W

$W = (3E\text{-}6)(8000)(5)$

$= 0.12\,J$

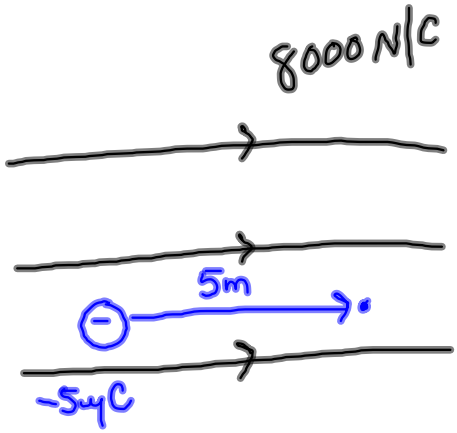
2) Find ΔPE

$= -0.12\,J$

3) Find ΔV $= \frac{-0.12\,J}{3E\text{-}6} = -40{,}000\,V$

$= -(8000)(5)$

Ex 5:



1) $W =$

$(5E{-}6)(8000)(5)\cos 180$

$W = -0.2\,J$

2) $\Delta PE = 0.2\,J$

3) $\Delta V = -Ed$

$= -8000(5) = -40{,}000\,V$

$= \frac{\Delta PE}{q} = \frac{0.2}{-5E6} = -40{,}000\,V$

keep sign of q

- As you move from one point to another in the SAME direction as the field, the Electric potential decreases

- If you move opposite direction to the E. field, electric potential increases.

Ex 6:

A positive 5eC charge is moved from A to B. Find the change in potential energy (ΔPE) of the charge.

$$\Delta V = V_B - V_A$$
$$= 300V - 100V$$
$$= 200V$$

$$\Delta V = \frac{\Delta PE}{q}$$

$$200V = \frac{\Delta PE}{5E\text{-}6}$$

$$\Delta PE = 0.001\ J$$