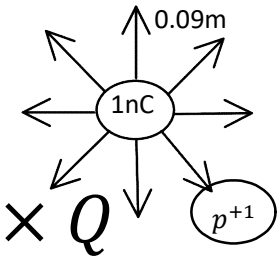
P12 - 8.0 - Elec Notes

Assume test point "p" = $+1C$? p^{+1} Not a Proton

Find the Potential and Electric Field Strength at a distance of 9 cm from a 1nC charge.



$V = \frac{kQ}{r}$

$V = \frac{9E9(1E-9)}{0.09}$

$V = 100\ \frac{J}{C}; V$

OR

$E = \frac{kQ}{r^2}$

$E = \frac{9E9(1E-9)}{0.09^2}$

$E = 1111\ \frac{N}{C}$

OR

$V = Er$

$V = 1111(0.09)$

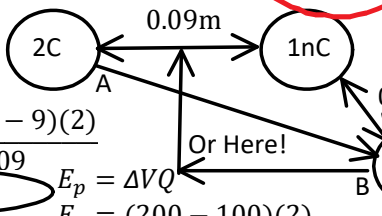
$V = 100V$

$\times Q$ $\times r$

Energy 1

Find the Potential Energy between a 1 nC charge and a 2C charge 9 cm apart.

Does Not Move*



$E_p = \frac{kQQ}{r}$

$E_p = \frac{9E9(1E-9)(2)}{0.09}$

$E_p = 200\ J$

$E_p = \Delta VQ$

$E_p = (200-100)(2)$

$E_p = 200\ J$

OR

Multiply the potential V by charge Q to get potential Energy!

Find the Potential of a 1nC charge at 4.5cm, and Potential Energy of a 2C charge at 4.5 cm.

$\frac{d}{2}$ Doubled!

$V = 200\ \frac{J}{C}$

$E_p = \frac{kQQ}{r}$

$E_p = \frac{9E9(1E-9)(2)}{0.045}$

$E_p = 400\ J$

Find the potential difference from A to B?

$Voltage$

$\Delta V = V_f - V_i$

$\Delta V = 200 - 100$

$\Delta V = 100V$

How much work to move the 2C charge A to B?

$\Delta E_p = E_{pf} - E_{pi}$

$\Delta E_p = 400 - 200$

$\Delta E_p = 200\ J$

OR

Positive work because Repulsive!

$\Delta E_p = \Delta VQ$

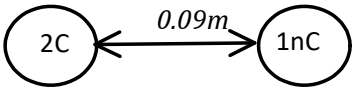
$\Delta E_p = (200-100)(2)$

$\Delta E_p = 100(2)$

$\Delta E_p = 200J$

Force 2

Find the electrostatic force between a 2C charge and a 1nC charge 9 cm apart.

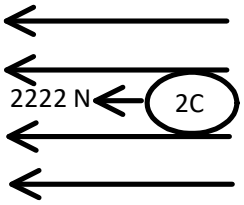


$F = \frac{kQQ}{r^2}$

$F = \frac{9E9(2)(1E-9)}{0.09^2}$

$F = 2222\ N\ Repulsion$

Find the electric field strength on a 2C charge with an electric force of 2222 N



$E = \frac{F}{Q}$

$E = \frac{2222}{2}$

$E = 1111\ \frac{N}{C}\ Left$

OR

$F = EQ$

$F = 1111(2)$

$F = 2222N$

Find E_p

$E_p = Fr$ $W = Fd$

$E_p = 2222(0.09)$

$E_p = 200\ J$

OR

Find the speed of a 2C charge after accelerating trough a potential difference of 100V. Kin Dyn Link

$\Delta E_p = \Delta VQ$

$\Delta E_p = (V_f - V_i)(2)$

$\Delta E_p = |(-50-50)|(2)$

$\Delta E_p = 100(2)$

$\Delta E_p = 200\ J\ Right$

$\Delta E_p = -\Delta E_k$

$E_k = \frac{1}{2}mv^2$

$v = \sqrt{\frac{2E_k}{m}}$

$v = \sqrt{\frac{2(200)}{2\left(\frac{e^-}{C}\right)(m_e)}}$

$v = 7E7\ \frac{m}{s}\ Right$

$v_f^2 = v_i^2 + 2ad$

$v_f = \sqrt{2ad}$

$v_f = \sqrt{\frac{2Fd}{m}}$

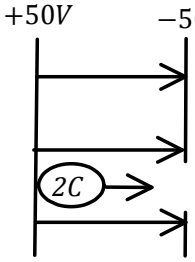
$v_f = \sqrt{\frac{2E_p}{m}}$

$F = ma$

$a = \frac{F}{m}$

$W = Fd$

Find the electric field strength between a +50V and -50V parallel plate 9 cm apart.



$E = \frac{\Delta V}{d}$

$E = \frac{|50-(-50)|}{0.09}$

$E = 1111\ \frac{N}{C}\ Right$

$\times Q$

Find the Force on the 2C charge.

$F = \frac{E_p}{d}$

$F = EQ$

$F = 1111(2)$

$F = 2222N$

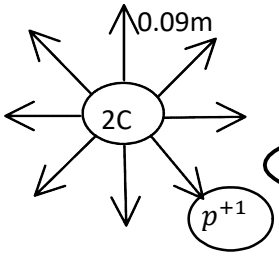
$F = \frac{200}{0.09}$

$F = 2222N$

OR

OR

Find the Potential of a 2C charge at 9cm

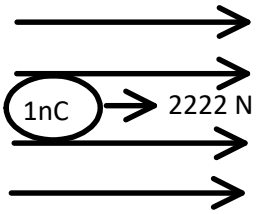


$$V = \frac{kQ}{r}$$

$$V = \frac{9E9(2)}{0.09}$$

$$V = 2E11\ \frac{J}{C}; V$$

Find the electric field strength on a 1 nC charge with an electric force of 2222 N



$$E = \frac{F_e}{Q}$$

$$E = \frac{2222N}{1E-9}$$

$$E = 2.222E12\ \frac{N}{C}$$

OR

Now does Not Move*

$$E_p = VQ$$

$$E_p = 2E11(1E-9)$$

$$E_p = 200\,J$$

$$E_p = Fr$$

$$E_p = 2222(0.09)$$

$$E_p = 200\,J$$

Find work to move 9cm

$$W = Fd$$

$$W = 2222(0.09)$$

$$W = 200J$$

Only parallel plates*
(It just works out)