$V = k\frac{q}{r}$

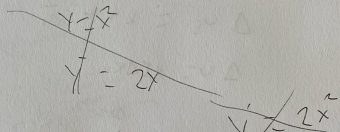
14 $q_1 = 3.4 \cdot 10^{-6}\,C$ $\quad d = 0.2m$ $\quad$ Find U

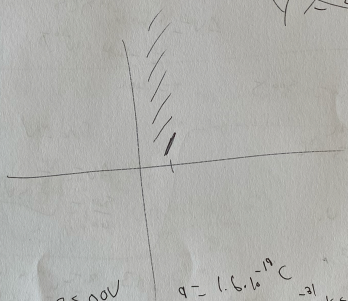
$q_2 = 6.6 \cdot 10^{-6}\,C$

$U = k\frac{q_1 q_2}{r}$

$U = \frac{9 \cdot 10^9 \cdot 3.4 \cdot 10^{-6} \cdot 6.6 \cdot 10^{-6}}{0.2}$

$U = 1.0089$





15 $\Delta V = 2500V$ $\quad q = 1.6 \cdot 10^{-19}\,C$

$m = 9.11 \cdot 10^{-31}\,kg$

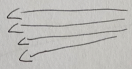
$v_i = 0$

$q\Delta V = \frac{1}{2}mv^2$ $\quad \rightarrow \quad v = \sqrt{\frac{2q\Delta V}{m}}$

$v = \sqrt{\frac{2(1.6 \cdot 10^{-19}) \cdot 2500}{9.11 \cdot 10^{-31}}} = 2.96 \cdot 10^7\,m/s$

$V = k\frac{q}{r}$ $d = 0.1m$

10 Find ΔU_E $x_i = 5m$ $x_f = 7m$



$E = 5 \cdot 10^2$ N/C

$E = k\frac{q}{r^2}$

$U_E = k\frac{q_1 q_2}{r}$

$\Delta U_E = k q_1 q_2 \cdot \frac{1}{\Delta r}$

$\Delta U = qE\Delta x$

$\Delta x = -3$

$\Delta V = 1.6 \cdot 10^{-14})(5 \cdot 10^2)(-3)$

$= -24 \cdot 10^{-16}$ J

11 $W = 500$ J $q = 40$C

Find ΔV

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

$\frac{500}{40} = \boxed{12.5V}$

12 $q = 5.5 \cdot 10^{-9}$C

$q_2 = -2.3 \cdot 10^{-8}$C

$\Delta U = U_f - U_i$

$U = k\frac{q_1 q_2}{r}$

r doesn't change

$U_f = U_i$

$U = \boxed{0J}$

13 $q_1 = 3.4 \cdot 10^{-6}$C

$q_2 = 6.6 \cdot 10^{-6}$C

$d = 0.1m$

Find V at 0.05m from each

$V = k\frac{q}{r}$

$V_1 = \frac{9 \cdot 10^9 \cdot 3.4 \cdot 10^{-6}}{0.05} =$

$V_2 = \frac{9 \cdot 10^9 \cdot 6.6 \cdot 10^{-6}}{0.05}$

$V_1 + V_2 = \boxed{1.78 \cdot 10^6 V}$

4

~~electric field~~

Cylinder that only coincides with wire

is the best as its surfaces within the wire and curved surface are electric field are perpendicular and uniform over it.

5

$q_1 = 3 \cdot 10^{-6}\ C$ at $0,0$

$q_2 = -6 \cdot 10^{-6}\ C$ at $(1,0)$

find V at $x = 0.5m$

$$V = k\frac{q}{r}$$

$$V_1 = \frac{9 \cdot 10^9 \cdot 3 \cdot 10^{-6}}{0.5} = 5.394 \cdot 10^4 V$$

$$V_2 = \frac{9 \cdot 10^9 \cdot -6 \cdot 10^{-6}}{0.5} = -1.0788 \cdot 10^5 V$$

$$V_{total} = V_1 + V_2 = 5.394 \cdot 10^4 - 1.0788 \cdot 10^5$$

$$= -5.394 \cdot 10^4 V$$

1

$V = k\int \rho(r)\,dV$

$V = k\frac{q}{r} =$

$q = 6\cdot10^{-6}\,C$

$r = 0.15$

$V = \frac{8.99 \cdot 6\cdot10^{-6}}{0.15} = 3.546\cdot10^{5}\,V$

2

$U_E = q\Delta V = 10$

$q = 2C$

$\frac{10}{2} = \Delta V = 5\,Volts$

3

$d = 0.1m$ $\quad E = 3\,N/C$ $\quad q = -1.6\cdot10^{-19}C$

Find ΔU

$\Delta U = qEd$

$\Delta U = (-1.6\cdot10^{-19})\cdot3\cdot0.1$

$= -48\cdot10^{-2}\,J$