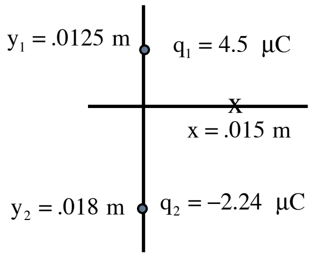
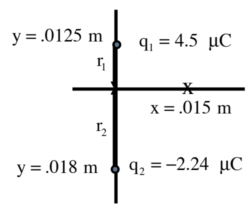
Electrical Potential of Point Charge Problem



a.) What is the electrical potential at origin?

b.) What is the electrical potential at (1.5 cm, 0)?

a.) The electrical potential at origin?



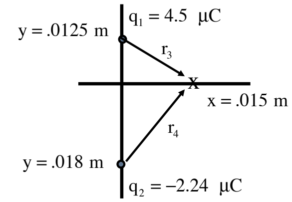
The important point here is that electrical potentials add as SCALARS, not vectors. Absolute electrical potential (point voltages) generated by positive charges are positive and absolute electrical potentials generated by negative charges are negative. In either case, the electrical potential function FOR A POINT CHARGE is

$$V_1 = k\frac{q}{r_1}$$

Using this on our situation, remembering to include the sign of the charge in the expression, we get:

$$\begin{aligned} V &= V_{q_1} + V_{q_2} \\ &= k\frac{q_1}{r_1} + k\frac{(-q_2)}{r_2} \\ &= \left(9x10^9\right)\frac{\left(4.5x10^{-6}C\right)}{(.0125\text{ m})} + \left(9x10^9\right)\frac{\left(-2.24x10^{-6}C\right)}{(.018\text{ m})} \\ &= 2.12x10^6 \text{ volts} \end{aligned}$$

b.) The electrical potential at (.015,0)?



The only things that is different is that the distances (the "r's" are different. Aside from that, the everything else looks just like part a.

$$\begin{aligned} V &= V_{q_1} + V_{q_2} \\ &= k\frac{q_1}{r_3} + k\frac{(-q_2)}{r_4} \\ &= \left(9x10^9\right)\frac{\left(4.5x10^{-6}C\right)}{\left(.0125^2 + .015^2\right)^{1/2}} + \left(9x10^9\right)\frac{\left(-2.24x10^{-6}C\right)}{\left(.018^2 + .015^2\right)^{1/2}} \\ &= \text{whatever} \end{aligned}$$