Name: _____ Phys 12

6.04 Electric Potential

Electric potential is the amount of _____ used to move one unit of _____ charge from one point inside an _____ to another (assuming it doesn't increase other forms of energy like kinetic energy).

electric potential energy

positive

V = $\frac{E_p}{q} = \frac{\frac{kq_1q_2}{r}}{q} = \frac{kq}{r}$ (volts, V)

Electric potential is also a _____ quantity, so it will be important to use _____ and _____ signs in your equations.

scalar

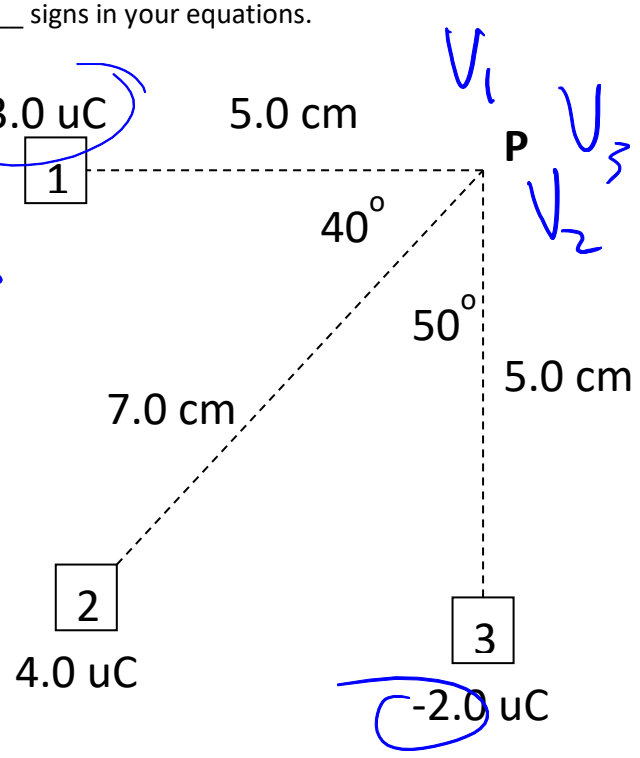
positive

negative

Ex. 1: Calculate the potential at P as shown in the diagram:

(690 000 V)

$V_{total} = V_1 + V_2 + V_3$



From your calculations, positive charges will move towards _____ potential, and negative charges will move towards _____potential.

low

positive

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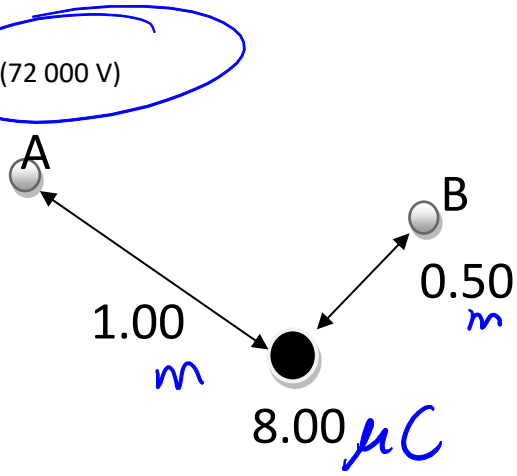
Previously, we've compared the potential difference relative to _____infinity_____ (0 V). If we want to compare it to another point in an electric field, we can find the _____potential difference_____ instead.

The **potential difference** between A and B/The potential difference from A to B is:

$$\Delta V_{A \to B} = V_B - V_A$$

Ex. 2: What is the potential difference between points A and B as shown below? (72 000 V)

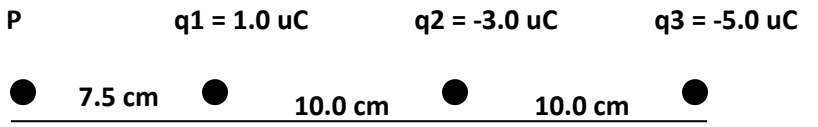


Worksheet 6.04 Electric Potential

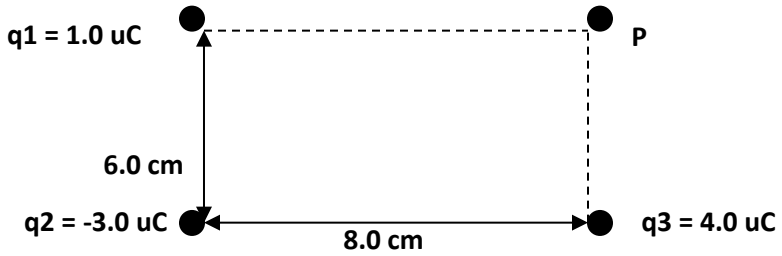
1) What is the potential at a distance of 6.0 cm from a 2.5 uC charge? (3.8×10^5 V)

2) What is the potential at a distance of 25 cm from a -2.5 uC charge? (-9.0×10^4 V)

3) Three charges are located in a line as shown. Find the potential at point P. (-2.0x105 V)



4) Three charges are located at the corners of a rectangle as shown below. Find the potential at point P.



5) 4.4×10^{-5} J of work is done moving a 3.00 uC charge at a constant speed from point A to point B. If A and B are 2.4 cm apart, what is the potential difference between A and B? (14.7 V)

6) The hydrogen atom has a single proton and a single electron.
a) Find the electric potential a distance of 0.50×10^{-10} m from the proton of the hydrogen atom. (29 V)
b) Use your answer to **a** to calculate the electric potential energy between the proton in a hydrogen atom and an electron orbiting the proton at a radius of 0.50×10^{-10} m. (4.6×10^{-18} J)

Bonus) A charge of – 3.00 μC is fixed in place. From a horizontal distance of 0.0450 m, a particle of mass 7.20×10^{-3} kg and a charge of – 8.00 μC is fired with an initial speed of 65.0 m/s directly toward the fixed charge. How far does the particle travel before its speed is zero? (0.011 m from -3.00 μC or traveling a distance of 0.034 m)

HW: Worksheet 6.04 All