Source: KBhPHYS201ConductorsEquilibrium

#ret

Run this PhET simulation (Links to an external site.). Using both an Electric Field Sensor, and Voltage inspector (cross hairs), explore the following topics. Submit your notes when you are finished. Be sure your notes include both the questions and their answers!

1. Place a single charge in the working area. Using the E-field sensor (with "values" selected), and the measuring tape, confirm that the E-field calculated by the PhET simulation agrees with the equation we have used in class. (Note, the units for E-field that we learned in class were N/C. The PhET simulation may express the units differently. But the numerical values should be the same.)
    1. The numbers seem to check out, (voltage is ~9 volts 1m away) since the charges are in nanoCoulombs
2. Place two positive charges in the working area. Where do you expect the E field to be zero? Does the simulation confirm that?
    1. Between the charges srcPhETChargesFieldsNeutralBetweenPositives.png
3. Same as above, but use one positive and one negative charge.
    1. E won't ever be zero, since the charges don't cancel each other out. However, if you are far enough away the field becomes negligible. srcPhETChargesFieldsNegligableField.png
4. The E field at a given point can be thought of as the force that a +1 C charge would feel if it were placed there. What does "electric potential" or "voltage" appear to represent? The units mentioned in #1 may be of interest as you consider this question.
    1. Apparently $\frac{N}{C}$ is equivalent to $\frac{V}{m}$, then the volt is $\frac{Nm}{C}$ aka $\frac{J}{C}$ (Joules per Coulomb)
    2. Then, "voltage is the difference in energy when you move a charge"
5. Does electric potential appear to be a scalar or a vector?
    1. Seems like a scalar, there's no arrow.
6. What or where is the zero-point for electric potential?
    1. On the line perpendicular to the segment between the charges through the midpoint of the charges.
7. What is the relationship between the local E-field vector and a line of constant electric potential? (You can explore this first by moving the voltage sensor (drag the little box, not the crosshairs) and observing the voltage values, then by plotting lines of constant potential).
    1. Constant voltage: 20phys201srcPhETChargesAndFieldsConstantVoltage.png
    2. The lines seem to be perpendicular to the field vectors.

When you are finished, you can play electric field hockey (Links to an external site.)for fun!