PhET Electric potential

The electric potential makes a connection to electric potential energy. If a charge q is placed at a location that has an electric potential V, then

$PE_{electric} = q\ V$,

The electric potential caused by a single point charge Q a distance r from that charge is given by

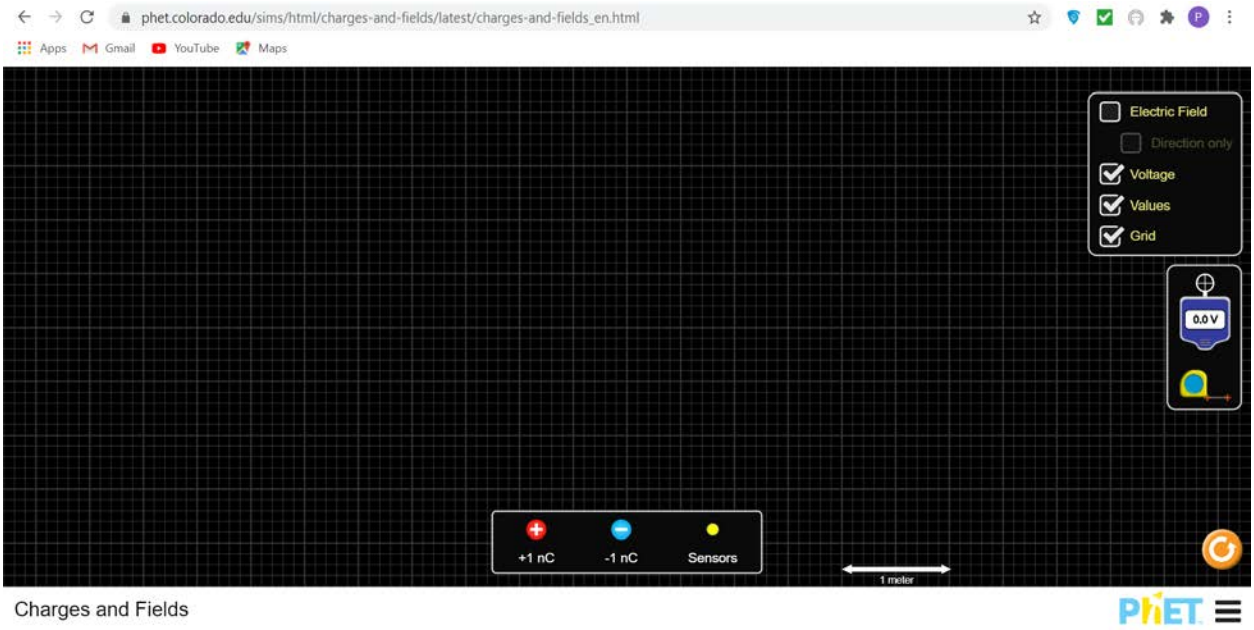
$V = K\ Q / r$,

The electric potential caused by more than one charge is the sum of the electric potentials caused by each individual charge. (There is that "superposition" thing again)

Start here:

https://phet.colorado.edu/sims/html/charges-and-fields/latest/charges-and-fields_en.html

Then click on "Voltage" (another word for electric potential), "Values" and "Grid" in the upper right part of the screen. You'll see this:



Drag a +1 nC charge and a -1 nC charge to locations near the middle of the screen so that they are at the same vertical level but 2.0 meters apart (according to the length scale at the bottom of the screen), with the positive charge on the left and the negative charge on the right. Now put the negative charge back in the box at the bottom of the screen so that only the positive charge remains.

Drag a voltage meter from the right side of the screen onto the screen and measure the electric potential along the horizontal line 1.5 m above the positive charge, starting 1.0 m to the left of

the horizontal position of the positive charge and continuing to the right at 0.5 m intervals until you get to the horizontal location 1.0 m to the right of where the negative charge was.

Now return the -1 nC charge to its original location and move the +1 nC charge back to the box. Repeat the measurements of the electric potential at the same locations.

Finally, bring the positive charge back to its original location so that the electric potential is caused by both the positive and negative charges. Measure the electric potentials at all of the locations you have measured previously, and determine the x and y components of the electric potentials at those locations.

Open a Word document and record in the document your electric potential measurements for +1 nC only, -1 nC only and with both charges in component form.

And then answer this question in the Word document:

Do the electric potentials caused by the individual charges add to give the electric potential caused when both charges are present?

Now remove the two charges from the screen and make a new arrangement of charges in which four charges are at the four corners of a square that is 2.5 m on a side. Two of them should be positive and two negative. It doesn't matter which charges are which polarities. Answer these questions in your Word document:

What is the electric potential in the center of the square? Does your answer make sense?

Convert your Word document to pdf and submit it via Canvas.