**AP Physics – Charges and Fields PhET Lab**

Today, you will use the Charges and Fields PhET lab to map the electric field around one or more point charges.

**Beginning Observations**

1) Open the Charges and Fields PhET simulation. What can you change about the simulation?

2) What do the “E-field sensors” show?

3) Select, show E-field. How does the color of the arrow relate to the strength of the field?

4) How can you make a charge of +2q? -3q?

**Part 1 – Field around isolated point charges**

5) Draw the field lines for the scenarios below. Make sure you are sketching *continuous* field lines.

|  |  |
| --- | --- |
| 4q | -2q |
|  |  |

**Part 2 – Field around two point charges in a line**

6) Draw the field lines for the scenarios below. Make sure you are sketching *continuous* field lines.

|  |  |
| --- | --- |
| Two unequal, unlike point charges | Two equal point charges |
|  |  |

**Place a test e-field sensor anywhere on the screen for both scenarios and draw what you see.**

7) When you have two like charges in a line – where is the electric field the greatest? Is there ever a point where the field will be zero?

8) When you have two unlike charges in a line – where is the electric field the greatest? Is there ever a point where the field will be zero?

**Part 3 – More complicated scenarios**

9) For this part of the lab, create three arrangements of your choice and draw the field lines you see.

|  |  |  |
| --- | --- | --- |
| 3 point charges, equal, like charges | 4 point charges, 2 positive, 2 negative, all unequal  | 5 point charges all unequal, 3 positive, 2 negative |
|  |  |  |

**Place at least three field sensors in each of your scenarios above and draw what you see on your diagrams.**

**Part 4 – The field around charge distributions**

10) Make a long line of **positive** charges by placing them very close together. How does the field change as you move down the line of charges?

11) Construct a parallel-plate capacitor where a second line of charges equal in size and opposite in charge are placed below the line of positive charges. Examine what the “E-field” is like between the plates using a sensor.