**Online Activity: Electric Field**

**Overview:**

You should already have some sense of what an electric field is. The electric field at a point in space describes the force that a unit of **positive** electric charge would feel if it were placed at that location. Loosely speaking, the pattern of electric field around a set of charges describes how they alter the space around them.

**Getting Started:**

Go to the following URL:

<http://nhsegal.github.io/FieldApplet/>

**What to Do:**

Play around a bit, exploring each feature. Then work through the questions below.

1. Does a red circle indicate a positive electric charge or a negative electric charge? (Circle one.) How do you know? What color indicates the opposite sign charge?
2. For the charge arrangement with two charges the slider adjusts the charge on only one of the charges. How can you judge when the two charges are equal in magnitude?
3. For a charge arrangement with two or more charges, select the “Mouse Drops Field Vectors.” Lay down a trail of arrows: near a charge make an arrow. Move to the end of that arrow and make a new arrow. *Etc.* Make a few trails like this. Then explore the “Mouse Makes Field Lines” options. What is the connection between this option and the trails you made?
4. Explore the “Mouse Makes Field Lines” option. Lay down some field lines then examine how the electric field arrow at the mouse cursor’s location relates to the field lines near the cursor.
   1. How does the direction of the electric field at the cursor’s location relate to the field lines near it?
   2. Make two field lines reasonably close. Place the cursor in between them. As the field lines converge/diverge, how does the strength of the field change?

1. What does the electric field line pattern look like for two positive charges that have the same magnitude charge? Sketch a prediction below and then test your prediction and correct it.
2. What does the electric field line pattern look like for two positive charges that have the different amount of positive charge? Sketch a prediction below and then test your prediction and correct it.
3. What does the electric field line pattern look like for a pair of opposite charges that have the same magnitude charge? Sketch a prediction below and then test your prediction and correct it.
4. What does the electric field line pattern look like for a pair of opposite charges that have the different magnitude charges? Sketch a prediction below and then test your prediction and correct it.
5. Students often think that if a little positive charge were placed on a field line it would follow that field line when released. If you google “electric field hockey Phet” and go to the first link, there is a program that will let you conduct this experiment. Do this. Use more than one charge to make the field. Explain why it is not true that charges always move along field lines.
6. Two different field lines never intersect (except on a charged particle). Why don’t field lines intersect in space?