# Guided Inquiry - Electric Fields

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teachers Notes:

This guided inquiry was designed for grade 12 students. It is meant to be done before discussing fields. The questions are designed to guide students towards understanding the shape and direction of fields around single and multiple charges. Students will also develop the relationship between charge strength and distance. Ultimately, students will get an appreciation for what a field is.

For more resources for high school physics. Please visit www.mrtsolu.com

Instructions:

1. Go to the link <https://phet.colorado.edu/sims/html/charges-and-fields/latest/charges-and-fields_en.html>
2. Place a single positive charge into the center of the screen. Click on Electric Field.
3. Sketch the field lines and direction around a single positive charge.
4. Now take a sensor and move it around. Is the field around the charge continuous or discrete? You will have to look up these terms. How do you know this?
5. Ignore the units, where are the values the same around the positive charge?
6. Take at least 5 measurements and come up with a relationship between the distance and the measured value on the sensor. Use the tape measure. Describe your method and your thoughts and any assumptions you make.
7. **STOP and Hypothesize** what the field diagram would look like for two positive charges. **Justify** your thoughts. Are there going to be areas where the value is 0? Where would they be if so? Why not, if you think that is the case.
8. Now prove/disprove your hypothesis by using the simulation.
9. Now place the positive charges so they are stacked on top of one another. What does this do to the number?
10. Come up with a relationship for the value measured in terms of the charge number and the distance. Discuss your method.
11. **STOP and Hypothesize** what the field diagram would look like for a positive charge and a negative charge. **Justify** your thoughts. Are there going to be areas where the value is 0? Where would they be if so? Why not, if you think that is the case.
12. Now prove/disprove your hypothesis by using the simulation.
13. Notice how bringing the opposing particles decreases the size of the field. Why do you think this is the case?
14. Notice that for the Sensor there is a vector? Is this a force? Why or why not? Compare the direction when the sensor is near a positive charge and then when it is near a negative charge.