Simulation Worksheet: Electric Field – One Dimension

1. Start with one charged particle only. Move the test charge (the small red ball) left and right to measure the field at various locations along the line. You can also leave the test charge in one location and change the sign and magnitude of the charge on the charged particle to see what effect that has on the electric field.
2. Still using a single charge, look at the graph of the electric field as a function of position. Move the test charge around to make sure that the information on the graph is consistent with the field as measured by the test charge. What does a positive field indicate? What does a negative field indicate?

3. Turn on the second charged particle, and set its charge. Once again, move the test charge left and right to measure the electric field at various locations along the line, and adjust the values of the charges on the particles and/or the positions of the two particles to see the effect on the electric field. In particular, see if you can find any locations where the net electric field is zero.
4. Using two charged particles, look at the graph of the electric field as a function of position. Again, move the test charge around to make sure that the information on the graph matches the electric field that is measured by the test charge.
5. Locations where the net electric field is equal to zero are special, because a charged object placed where the net field is zero experiences no electrostatic force. Using two charged particles, under what conditions is there a point in between the charged particles where the net electric field is zero? Using two charged particles, under what conditions is there a point to the right or left of the charged particles where the net electric field is zero? For two charged particles, is there a general rule for how many locations there are in the vicinity of the charged particles where the net electric field is zero? If so, what is it?