

Simulation Worksheet: Electric Force – Three Charges

1. Your challenge is to rank the three objects based on the magnitude of their charges, from largest to smallest. You should be able to do this without doing any calculations. First, drag the charges around the screen, putting them into whatever position you wish, to determine the ranking. Select the correct ranking from the list of six options at the bottom of the screen, and press the "Check Answer" button in the menu at the right to see if you are correct. Figure out a system for determining the ranking that works for you every time (note that pressing the "Get new charges" button gives you a different set of charges with, most likely, a different ranking). Write a short description of how your system works.

2. Now, un-check the "Charges are draggable" checkbox at the top right so that the charges are fixed in position at the corners of an equilateral triangle. Check the "Show helpful lines" button to view lines that connect the corners of the triangle, as well as lines that run from the center of the triangle to each corner. Your goal now is to determine a new system of ranking the charges that does not involve moving them around the screen. First, keep pressing the "Get new charges" button until you get a system of three like charges at the corners. Figure out a system for ranking the objects based on the magnitudes of their charges when the objects all have positive charges (all the objects are red), and when they all have negative charges (all the objects are blue). Describe your system.

3. Finally, see if you can come up with a system for ranking the objects based on the magnitude of their charges when the charges do not all have the same sign. Briefly describe the system you come up with when the objects are fixed in place at the corners of the equilateral triangle.