8.5 Fields and Field Mapping

Coulomb's Law is helpful for determining the electrostatic force (Fe) between 2 charges. When there are 2,3, or even 4 charges, one can make the individual calculations and determine Fnet.

(Fnet = sum of all the forces).

However, when there are many, many charges (ie: charged particles on your TV screen), it is difficult (impossible!) to calculate the net force on say, a small charged dust particle in the air. We would have to determine the Fe between the dust particle and every single charge on the screen and then find the sum!! So instead of this, we take the focus away from charge-charge forces and determine the force felt by the individual charge. Then we map this 'force felt' out as a 'field map'.

Field = a region in 3-dimensional space in which a property or quantity (such as force), may be distributed.

Electric Field Map – map that shows the electrostatic force felt by a **positive particle**.

The closer the test particle is to the source of charge, the stronger the Fe that is felt.

How to Draw Field Maps

#1 – The test charge (qt) is always a positive charge by convention. Thus, your map shows what a positive particle would experience. The directional arrows show the direction a +ve test charge would move. (Direction)

#2 – The denser the lines of force, the stronger the force. (Magnitude)

#3 – Can also show equipotiential lines. These are lines that join areas that experience the same magnitude of force. Field lines are drawn at right angles to these lines.

Page 391 show the basic examples of field maps.