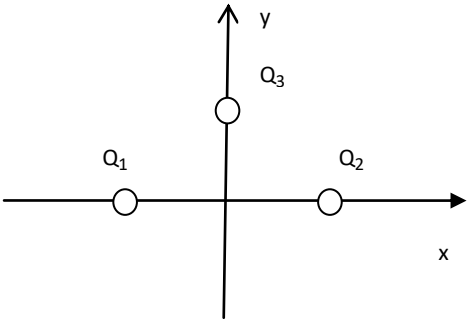
ELECTRIC FIELD OF POINT CHARGES

In this lab, at first, you will solve the two following problems and then you will check if your solutions fit to those provided by the simulator of EM field available in lab computers. At the end of lab you should hand in one set of solutions per pair of students.



1] Three point charges are arranged as follows:

Q_1= +q is located at (-a, 0) Q_2= +q is located at (+a, 0)

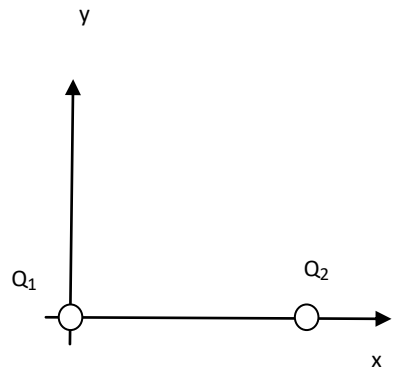
Q_3= -q is located at (0, +a)

/20 **1.a** Find the expression of electric field vector at the origin O(0,0)

/20 **1.b** Find the expression of electric field vector at point P(0, -a)

/12 **1.c** There are two points in the space around these charges where the field strength is zero. Find where they should be located approximately. Sketch a vector diagram of three field vectors at these points and show how they add to zero.

/8 **1.d** Use the program EM fields to draw the electric field lines out to at least 3a from the origin in all directions. Print the diagram and mark on it the location of two points where field is zero.



2] Two point charges are arranged as follows:

Q_1= +q is located at the origin O(0,0)

Q_2= -4q is located at x = a, y = 0.

/32 **2.a** Find location and calculate the coordinates of a point P (not at infinity) in the field where E=0.

/8 **2.b** Use the program EM field to draw the field lines out to at least 2a from the origin in all directions. Print the diagram and mark on it the location of the point P where the field is zero.

Using EM Field software:

*-To include charges**, click on ADD;** click and drag the required **circle** of charge to the desired point on the field.* Once the charge is placed on the screen, you will see its coordinates (x, y) down. Use them to include the other charges at such coordinates that fit with geometry requirements of problem**.**

- If the field line do not show up on the field click on the button Automatic FIELD LINES

-With the field lines drawn, select *FIELD AND POTENTIAL and try FIELD VECTOR or DIRECTIONAL ARROW to verify the relationship between the field lines and the electric field vectors (due to each charge and their sum) or EQUIPOTENTIALS to draw equipotential lines.*

-To print the display:
*__Select File__ then __Save picture of screen__ and type the file name. a:\Filename(write a "filename")
*Select __Options__, then __Quit__
(Since this is a DOS program, you have to quit in order to open another application)
*Print the saved file in "landscape mode"