Jimmy Casey
Partner: Blake Segars

In this experiment, students were expected to create two point charges and graph their electric field and electric potential using sage math.

Introduction

When two point charges are within the same system of each other, their electric potential and electric field interacts. This interaction is showing a graph that has been created off of sage math.

Procedure

Students are to make up two point charges on a graph. This graph will include lines for electric potential and arrows for electric field. Students are also expected to draw a rough sketch of what this graph is expected to look like.

Data

On calculations page.

Analysis

Equations:

$$Ep = \frac{k * q}{\sqrt{(x - x_1)^2 + (y - y_1)^2}}$$

$$Ef = \frac{k * q}{(x - x_1)^2 + (y - y_1)^2}$$

Summary

Electric potential is shown by lines that are interacting around both points. Electric potential is non directional. Electric field is shown by the arrows around the two point. It is depicted by arrows because electric field is a vector since it has direction.

Calculations

lab 14

(1,2) (3,4) $r = \sqrt{8}$

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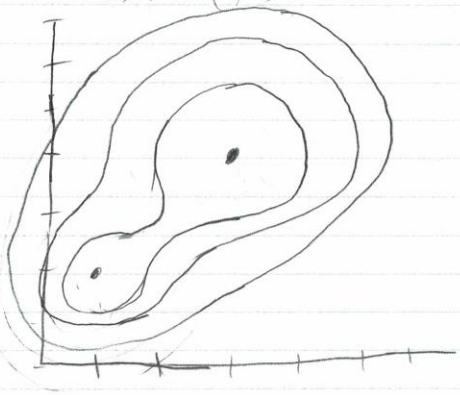

$q_1 = 1 \times 10^{-9} C$

$q_2 = -2 \times 10^{-9} C$

$$E_p = \frac{(k)(1\times10^{-9})}{\sqrt{(x-1)^2+(y-2)^2}} + \frac{(k)(2\times10^{-9})}{\sqrt{(x-3)^2+(y-4)^2}}$$

$$E_{q_1} = \frac{(k_e)(1\times10^{-9}C)}{8} = 1125\ N/C$$

$$E_{q_2} = \frac{(k_e)(2\times10^{-9}C)}{8} = -2250\ N/C$$

$$\vec{E}_F = \left(\left(\frac{(k)\,1\times10^{-9}}{(x-1)^2+(y-2)^2} \right) \left(\frac{x-1}{\sqrt{(x-1)^2+(y-2)^2}} \right) \right\} + \left(\left(\frac{(k)\,2\times10^{-9}}{(x-3)^2+(y-4)^2} \right) \left(\frac{x-3}{\sqrt{(x-3)^2+(y-4)^2}} \right) \right) ,$$

$$\left(\left(\frac{(k)(1\times10^{-9})}{(x-1)^2+(y-2)^2} \right) \left(\frac{y-2}{\sqrt{(x-1)^2+(y-2)^2}} \right) + \left(\frac{(k)(2\times10^{-9})}{(x-3)^2+(y-4)^2} \right) \left(\frac{y-4}{\sqrt{(x-3)^2+(y-4)^2}} \right) \right)$$

Calculations

$$\vec{E}_{f_x} = \frac{(9(x-1))}{\left((x-1)^2+(y-2)^2\right)^{(3/2)}} + \frac{18(x-3)}{\left((x-3)^2+(y-4)^2\right)^{3/2}}$$

$$\vec{E}_{f_y} = \frac{9(y-2)}{\left((x-1)^2+(y-2)^2\right)^{3/2}} + \frac{18(y-4)}{\left((x-3)^2+(y-4)^2\right)^{3/2}}$$

Data

SageMathCell

Type some Sage code below and press Evaluate.

```
-4, 7), (y, -2, 8), fill=False, cmap="jet", labels=True, contours=[ 2, 3, 4.5, 8, 12, 17, 35], label_fontsize=14)
-4)^2)^(3/2)) , ((9*(y-2))/((x-1)^2+(y-2)^2)^(3/2)) + ((18*(y-4))/((x-3)^2+(y-4)^2)^(3/2))) , (x, -4, 7), (y, -2, 8)
```

Evaluate

Language: Sage

Share