Experiment 1 Force Between Two Charged Particles

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We used a phet to simulate the forces between two charges at varying distances, we then calculated the forces between two charges under various different situations. We then calculated the coulomb constant and compared the calculated coulomb constant to a given handbook value of the coulomb constant to get a percent error. I ended up with a percent error of 8.99\*1011%.

Results

In this section of your report show your final model/equation for the force between two charged particles, and declare the value you calculated for the Coulomb Constant and how well it agrees with the handbook value. Do some research online to see what a reasonable % Error maximum would be when comparing an experimentally determined value to a Handbook value.

My equation for the final model between two charged particles is y = 0.899x + 4E-15 which resulted in a Coulomb Constant of 2.25\*1014 which has a 8.99\*1011% error relative to the handbook value. My research said that a reasonable maximum % error would be 10%, which is far below what my actual error was.

Questions for Discussion

1. Looking at the first data set (the data points for each data set is a different color) for q2 having a charge of 1 μC what type of relationship is it forming? Is it a linear relationship? Or, is it something else?

A power relationship was forming.

1. Which of the 5 general equations did you choose for the trendline fit for graph 1? What simple numerical value does the power of r seem to approach?

y=AxB was the general equation. The power of r seemed to approach 2.

1. For the data you graphed in Table 3, what kind of relationship is seen in the graph? How does the force F vary as you vary q2? What if you reversed the roles of q1 and q2? Set q2 to 1 μC and vary q1. Do you get the same relationship, or a different one? If you get the same relationship how do q1 and q2 get written into the value for A? If you get a different relationship how does this affect how q1 and q2 are written into the value for A?

A linear relationship was seen in the graph of table 3. F increased at a rate of 0.899N per μC. The same relationship would be found if q2 was set to 1 μC, provided the graph had q1 on the x axis. q1 or q2 (depending on which one is constant) multiplied by R (roughly 9\*109) and divided by r2 would be equal to A because that value would be constant as the other charge was changing.

1. In graph 4, is the resulting trendline what you expected when considering your model/equation that you are generating?

Yes, because

Because Q=q, r=0.1, and k=8.99\*109

Because the charge is graphed on the x-axis, Q=x

Which is the same equation as the trendline of the graph (in power form).