

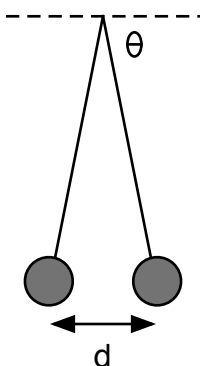
## Lab 32-2: Coulomb's Law

- Purpose:**
1. To determine the quantity of charge on a graphite-coated sphere.
  2. To determine the number of extra or missing electrons the sphere.

**Procedure:**

1. Mass the two graphite-coated spheres and record in the data section. (This is probably written on the board.)
2. Charge up the items by friction (this will depend on the class.) Then, charge up the two graphite coated spheres by contact.
4. The two spheres should now be repelling one another. There are two things you have to measure while the spheres are charged: the distance between the spheres and the angle the string makes with the wooden rod

**Data:**



Mass of one sphere: \_\_\_\_\_ kg

Angle of string: \_\_\_\_\_ °

Distance between spheres: \_\_\_\_\_ m

**Calculations:**

*First, let's figure out the sign of the charges on the spheres.*

1. What did you charge by friction?
2. After charging by friction, what were the signs of the charges on those items?
3. After you charged the spheres with contact, were the spheres positively or negatively charged? How do you know?

*Now, let's figure out the magnitude of the charge on the spheres.*

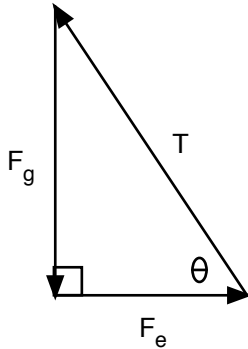
4. There are three forces acting on each sphere. Make a diagram showing these forces on the sphere on the right. You do not need to use numbers, but make sure you label the forces.
5. Why must these forces add up to zero?

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6. Calculate the weight of each sphere.

$F_g = \text{_____ N}$

7. The diagram shows the three forces acting on the sphere adding up to zero. You just calculated the weight ( $F_g$ ) and measured the angle earlier. Using trig, find the magnitude of the electric force on the sphere. (Hint: which trig function should you use if you know the opposite side, and want to know the adjacent side? Even More Hints: Look on the board.)



$F_e = \text{_____ N}$

8. Calculate the magnitude of the charge on the sphere by using Coulomb's Law. (Assume that you charged each sphere an equal amount, so that  $q_1 = q_2$ .)

9. How many missing or extra electron are on each sphere? (Remember that the magnitude of the charge of one electron is  $1.6 \times 10^{-19}$  C.)

\_\_\_\_\_ C  
 \_\_\_\_\_ missing/extra electrons