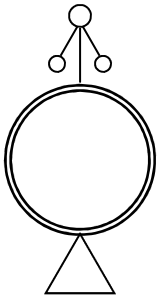
B-Day Due Fri., Jan 7
A-Day: Due Mon., Jan 10

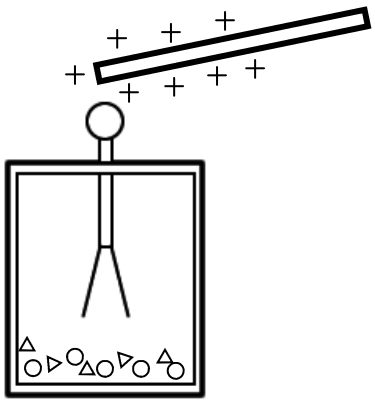
2011 PreAP Electrostatics 3



From the demo in class:

1. A negative rod is rubbed against the top of the metal apparatus. The pith balls attached to the metal ball fly out.
   A. Draw what happens to the pith balls inside.
   B. What does this prove for us about safety and lightening?

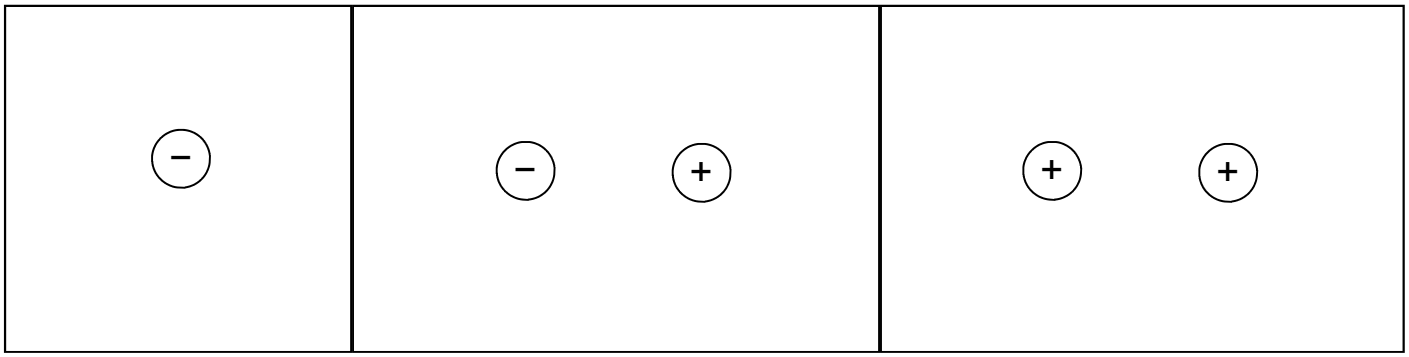
2. A positively charged rod is brought close to an electroscope.

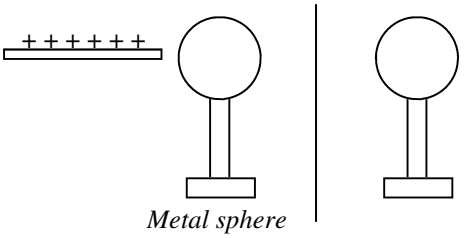


   A. Does the rod have more electrons or protons?
   B. What is the rod probably made of and what was it rubbed against to make it positive?
   C. Draw which side of the electroscope is positive and negative.
   D. This is called charging by:
   E. At the bottom of the electroscope are positively charged triangles and negatively charged circles. Draw which shape will be attracted to the leaves of the electroscope.

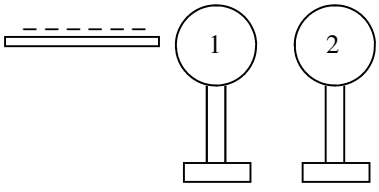
3. Electric field lines point the direction a positive charge would move. Positive charges move _____ from positive charges and _____ negative charges. So, electric field lines point _____ positive charges and _____ negative charges.

4. Draw the following electric field situations.





5. A charged glass rod is placed near a single metal sphere.
   A. Why is the glass positive?
   B. What is the charge of the left side of the sphere when the rod is next to it?
   C. What is the total charge (net) of the sphere when the rod is next to it?
   D. This is called charging by _____.
   E. When the glass is removed, what is the charge on the left side of the sphere?



6. Two metal spheres are near a negatively charged rod.
   A. What kind of rod is it (probably)?
   B. What is the charge on the right side of sphere 2?
   C. What is the net charge on sphere 1?
   D. If you touched sphere 2 it would end up with a _____ charge.

And the units shall set you free…. And in this chapter it will.

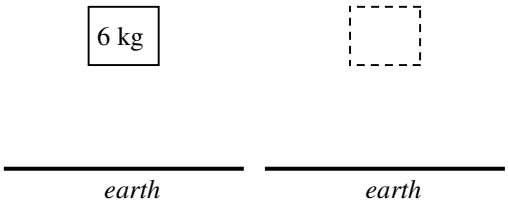
7. A −6 C charge is placed at a point that has an electric field strength of 4 N/C.
   A. * What force does it feel?

   B. Will the charge move with or against the field?

8. A 2μC charge is placed in a 5.8×10^{-4} N/C electric field.
   A. Calculate the electric force on the charge.

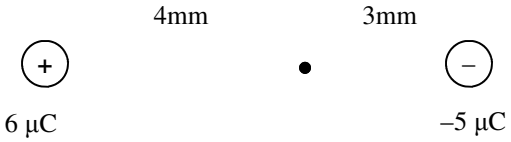
   B. Will the charge move with or against the field?

9. A 8.5 μC charge feels a force of 2.5×10^{-5} N. Calculate the electric field strength.



10. A. * In the left picture the gravitational field (g) the mass feels is:
    B. In the left picture the gravitational force is:
    C. What provide g?
    D. * So, how many masses are necessary for g?
    E. * What is g for the same position when the mass is removed?

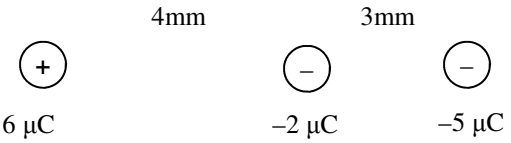
    So, gravitational field is about the position. OR—it must be an external field. (Can't act on itself.)



11. Two charges are configured as shown.
    A. * Calculate the electric field at the point due to the left charge.

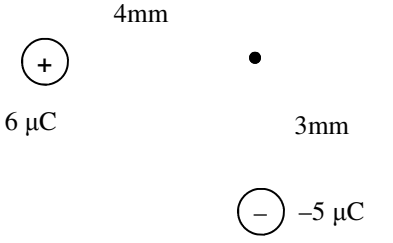
    B. * Calculate the electric field at the point due to the right charge.

    C. Remembering that electric fields are vectors, calculate the total electric field at the point.



    A negative charge is then placed at the point.
    D. * Calculate the net electric field at the point (where the −2μC charge is).

    E. * What is the force on the −2μC charge?



    The charges are moved.
    F. Calculate the net electric field for the new configuration.

Q7: N/C times C give N: 24 N; Negatives move against the field (field is direction +'s go); 10A: 10 N/kg; 10D: one (the earth)
10E: same 10 N/kg; Q11A: 3.375×10^{9} N/C ; Q11B: 5×10^{9} N/C; Q11D: the same as in Q11C.
Q11E. Mult your answer in Q11C by the charge. N/C times C give N.