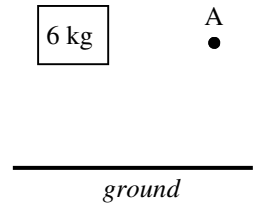
A-day: Due Mon., Apr 6
B-day: Due Tues., Apr 7

2009 Electricity 3

Name: _____



1. *A 6 kg object is above the ground.*
   A. How much force does it feel?

   The 6 kg object is then removed.
   B. Is there a force at position A?

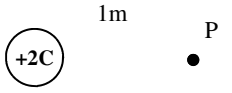
   C. So, in order for there to be a force, there must be at least how many masses?

   D. At position A, is there still gravity?

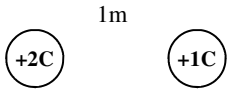
   There is no gravitational FORCE, but there is a potential for a force—a gravitational field!
   E. At position A, if a 15 kg object were placed there, how much force would it feel?

   F. So for every kg of mass at A, how many Newton's of force is there?

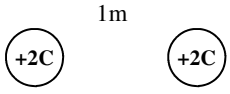
Notice that the gravitational field is due to only one mass—the earth—the mass setting up the gravitational field. Likewise, E, the electric field is due to only 1 charge—the one that sets up the electric field. Of course, there can be other charges that create their own fields, but the field is NEVER due to the charge at the point you are talking about.



2. At the left two +1C charges are placed 1 m away from each other (for simplification).
   A. Calculate the electric field at point P due to the 2C charge (*leave your answer in terms of k_c [leave k_c as a variable*]).



   B. Calculate the electric field at that same point if a +1C charge is there (the electric field is still due only to the left charge).



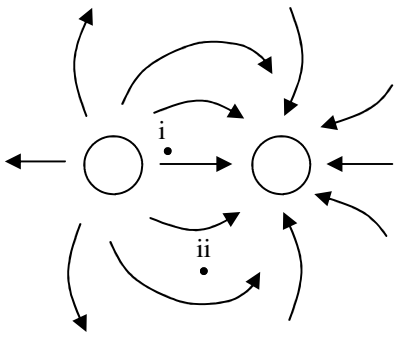
   C. Calculate the electric field at that same point if a +2C charge is there.

   Notice that the electric due to the left charge does not depend on the right charge. The electric force will increase, but not the electric field.
   D. Since the units are N/C, how much force does the +2C charge feel?

3. Calculate the electric field 5 cm from a 2.4μC charge.

4. A) If there is an electric field of 20 N/C, how much force does it give to a 1 coulomb charge?

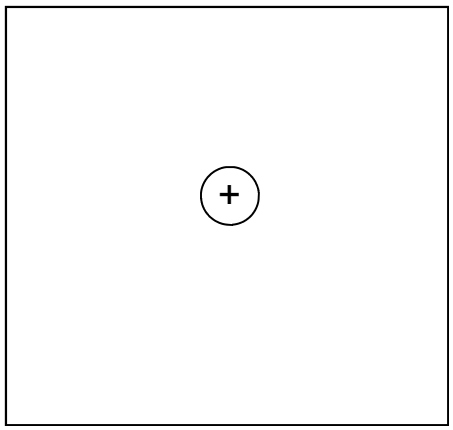
   B) How much force does it give a 3 coulomb charge?

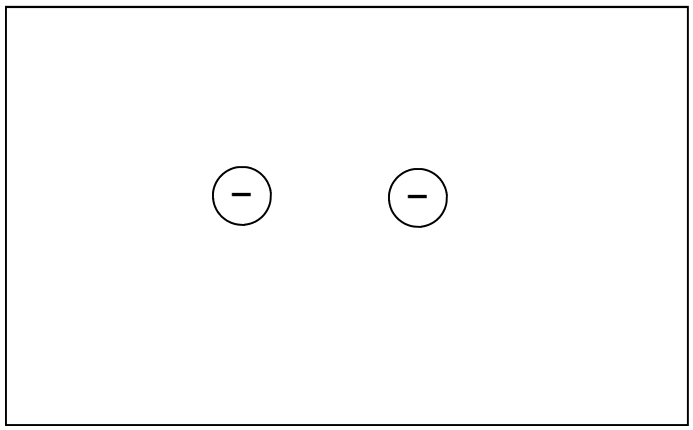


5. Find the electric force of a 4.8 coulomb charge if it is in a 2.6 N/C electric field.

6. A. Label the two charges correctly.
   B. Which point has a stronger electric field?
   C. Why?

   C. In which of the two points will a third charge feel the stronger force?

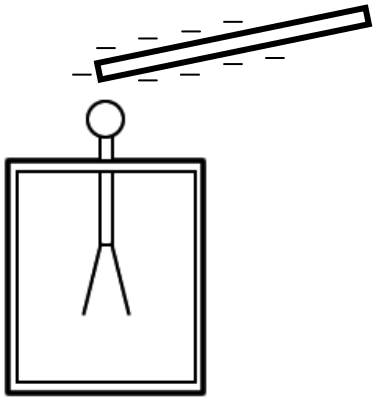




7. Draw the electric fields for the two situations above.

From our electrostatic demos. (*Notes: "Separating Charge*")

8. A piece of plastic pipe was rubbed with a piece of fur.
   A. Is the plastic positive or negative?
   B. When the plastic is suspended and another charged piece of plastic is brought close, does the suspended plastic pipe move away or come towards the second pipe?
   C. Then a piece of glass is rubbed with silk. Is the suspended plastic pipe attracted to or repelled by the glass rod?
   D. So is the glass rod positive or negative?



9. Electroscope questions:
   A. When I put a negatively charged rod near the top of the electroscope, the leaves fly apart. (*This is the important part.)* Why, <u>exactly</u>?

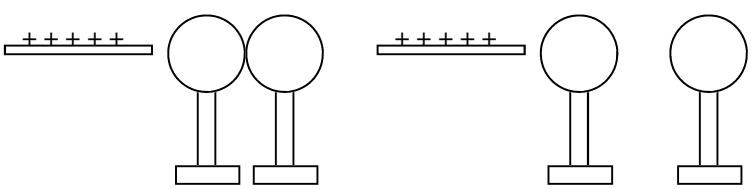
   C. If I rub the electroscope with the charged rod, the leaves stay out. Why?

   D. This is called charging by:
   E. How do I get the leaves back together?
   F. The electroscope is neutralized. The negative rod is brought back close to the electroscope. This time I put my finger on the electroscope. What happens?

   G. Why?

   H. This would be called charging by:
   I. What charge are the leaves now?

Before *After*



10. Two metal spheres are brought close to a + rod.
    A. Where will the sphere's electrons go: towards or away from the + rod?

    B. When the spheres are separated, will the electrons still be attracted by the rod?

    C. So, what charge is the right sphere after?

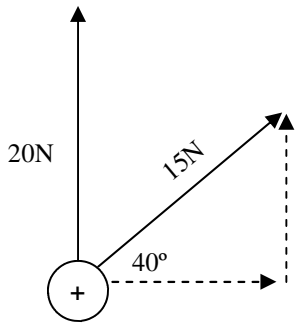
OK—I will break this down for you one last time.
Notes: "Adding Vectors" and "Vector Basics"

11. Two forces are pulling on a positive charge as shown.
    A. Calculate the x and y components of the 15 N force using sin and cos. Put them on the dashed parts of the diagram

    B. Since the 20N force is vertical is it an x or y force?

    C. Add together all x and y forces and draw a new triangle below the diagram.

    D. Calculate the net force's magnitude (the hypotenuse) and its direction.



Characteristics of Life

1. Made of cells – (multicellular have organization, like tissues)
2. Metabolism – uses and obtains energy
3. Maintain homeostasis – responds to stimulus (like avoiding danger); tries to keep itself
4. Reproduces within its species (sexually or asexually)
5. Passes on a genetic code of DNA.
6. Adapts to their environment over time.

12. Viruses are not alive.
    A. What characteristic of life do viruses have?
    B. Give one characteristic of life that viruses do not have that proves they are not alive.

13. Alive or not? Prove your answer with one of the characteristic of life.
    A. An object deliberately moves from light to dark.
    B. An object is left alone and days later is found to have split several times by itself.
    C. An object is subjected to high heat and different types of light. The object does not respond in any way