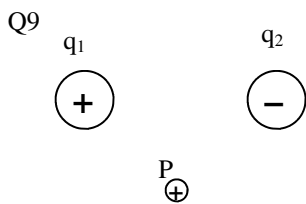
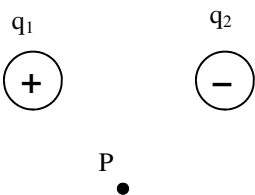


2010 PreAP Electrostatics 5

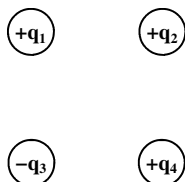


1. A small positive charge is placed at point P, near two larger charges.
 - A. Will the charge p move towards or away from q_1 ?
 - B. Draw an arrow showing the direction charge p will move due to q_1 . (label the arrow F_1).
 - C. Will the charge p move towards or away from q_2 ?
 - D. Draw an arrow showing the direction charge p will move due to q_2 . (label the arrow F_2).
 - E. Draw the resultant (vector sum) of these two forces (arrows). (This is the direction charge p will move due to both of these two charges.) Label this arrow F_R .



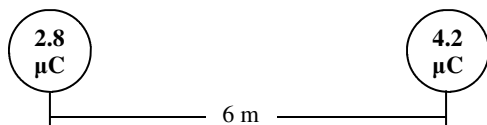
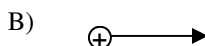
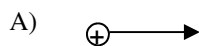
Now, charge P is removed.

- F. Draw the same three arrows as in question 3. Since the electric field points in the direction a positive charge would move, the electric field at p, points in the same direction of F_R , but label it E.

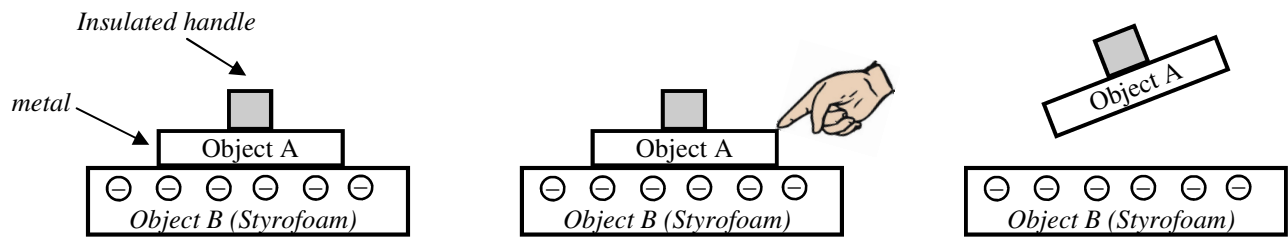


2. Four **equal charges** are placed near each other as shown, as if at the four corners of a square.
 - A. Draw and label the individual forces on the q_3 .
 - B. Draw the net force on q_3 , labeling it F_{net} .
 - C. How would the net force change if q_1 were increased?
 - D. How would the net force change if q_2 became negative?

3. In the following situations a small charge is near a larger charge. An arrow shows the smaller charge moving before hand. No arrow means the smaller charge is originally at rest. In each situation, draw the path of the smaller charge.



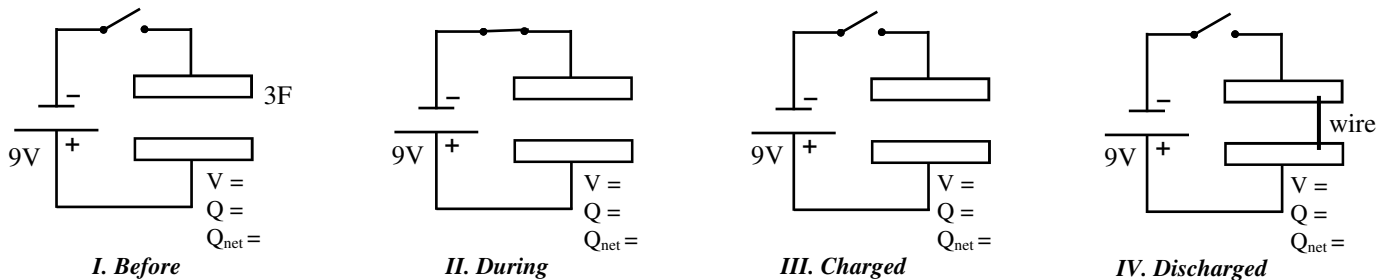
4. Find the equilibrium position between the two charges at the left.



5. On the diagram above, Object B has been made negative by rubbing it with fur. Object A is a metal pie plate.
 - A. In the first picture (left) draw where the negatives are on Object A.
 - B. Object A is now charged by _____.
 - C. Then you touch Object A while it is still touching to object B, where do the negatives go?
 - D. After you touched Object A, (3rd picture) will Object A have a positive or a negative charge?
 - E. Object A is now charged by: _____.

Capacitors

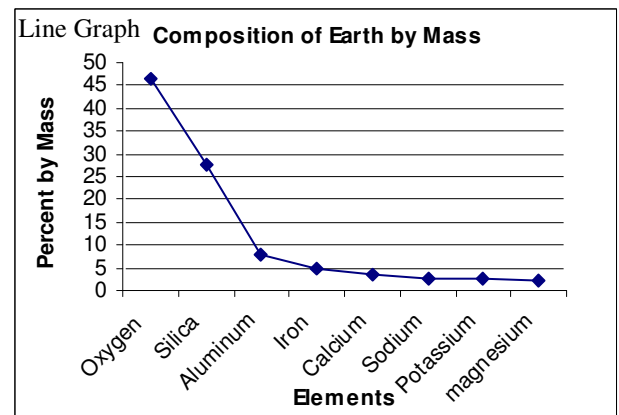
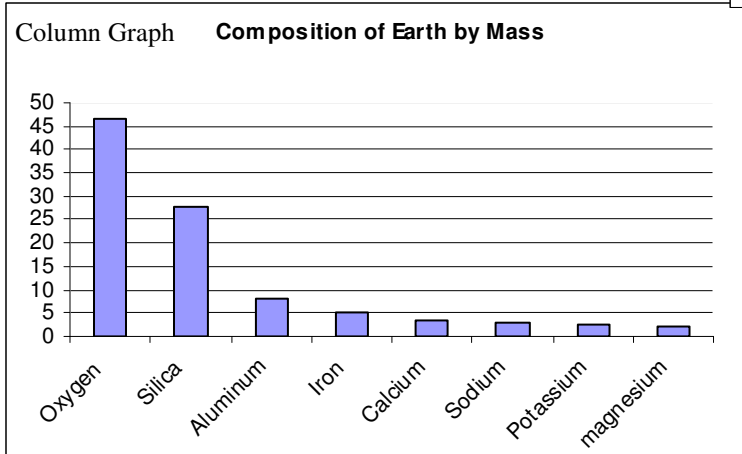
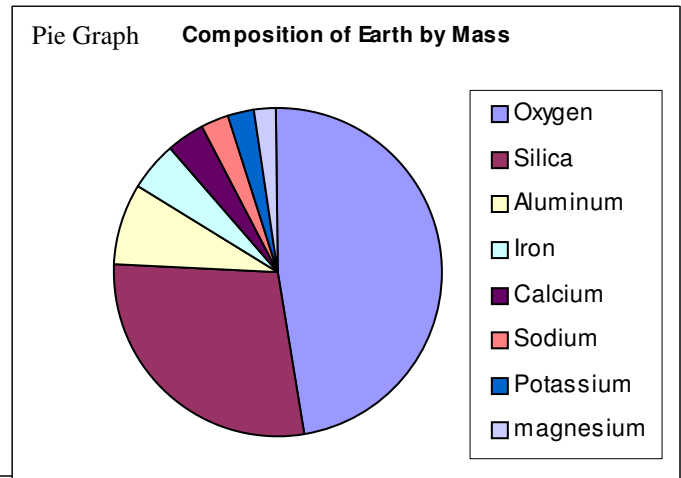
6. Give the units for capacitance and what those units mean.
7. A 9 V battery is hooked up to a 1 F capacitor.
 - A. How much charge can it hold?
 - B. How much charge can a 2 F capacitor hold for the same potential?
8.
 - A. On the diagrams below draw what occurs on the capacitor plates. Be correct as for which plate is positive.
 - B. For each of the stages, give V, Q, and Q_{net}. If you can't completely calculate (II), give < or >.



9. A neutral 3 pF (pico farad) capacitor ($\text{pico} = \times 10^{-12}$) is placed in a circuit, but not the switch is not closed.
 - A. What is the charge on one of the plates?
 - B. *A 12 V battery is then connected and charges the capacitor.* What charge will be gained by the positive plate?
 - C. What charge will be gained by the negative plate?
 - D. How much potential energy is stored?
 - E. What is the total charge on the capacitor?
 - F. What is the final voltage across the capacitor?
 - G. The capacitor is then discharged. What is the final voltage and charge of the plates?
 - H. If the voltage were doubled, how much charge could it hold?
 - I. How would the capacitance change if the voltage were doubled?

Types of Graphs:

10. Which type of graph makes it easy to see that Oxygen is roughly one-half the total?
11. Which type of graph makes it easy to see that Oxygen is almost twice the amount of Silica?
12. Which type of graph allows you to easily see how the different elements compare to one another (*how big they are to each other*)?
13. Which type of graph allows you to easily see how each element compares to the total mass (*what percentage they are of the whole*)?
14. Which graph makes no sense for this data?



15. Which kind of graph would you use: bar graph (B); pie chart (C); line graph (L)?
 - A. ____ You want to know how where an object is after 3 seconds.
 - B. ____ You want to know how the population of migratory birds differs between multiple wetland locations.
 - C. ____ You want to know what percentage of your income is spent on entertainment.
 - D. ____ You want to predict the population of insects at a certain time after collecting data for several days.

16. (*For lines graphs*) - X or Y axis?
 - A. ____ Is the dependent variable.
 - B. ____ Is the responsive variable.
 - C. ____ Records what you are measuring.
 - D. ____ Records one of the control variable.
 - E. ____ Records what you are changing in the experiment (experimental variable).
 - F. ____ Is the manipulated variable.
 - G. ____ Is the independent variable.