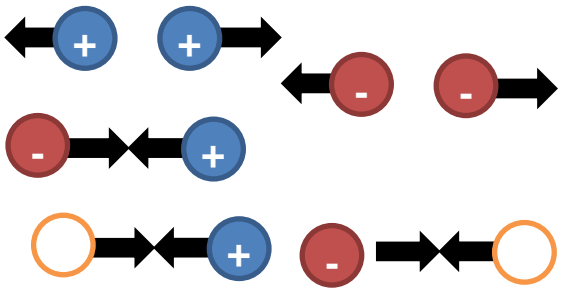
10.2 - Charging by Contact and Induction

THE LAWS OF ELECTRIC CHARGES

1. There are three laws of electric charges. Complete them.
   A. Like charges _____ each other.
   B. Opposite charges _____ each other.
   C. Charged and neutral objects _____ each other.



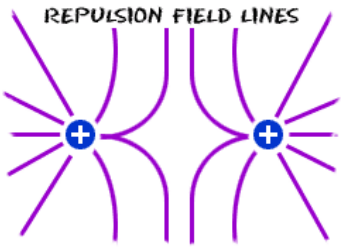
2. The amount of electric force (either attraction or repulsion) between two objects depends on two factors: the _____ of charge on each object, and the _____ between the objects.

   b. The greater the charge, the _____ *(higher/lower)* the force.

   c. The greater the distance, the _____ *(higher/lower)* the force.

3. Define the following:

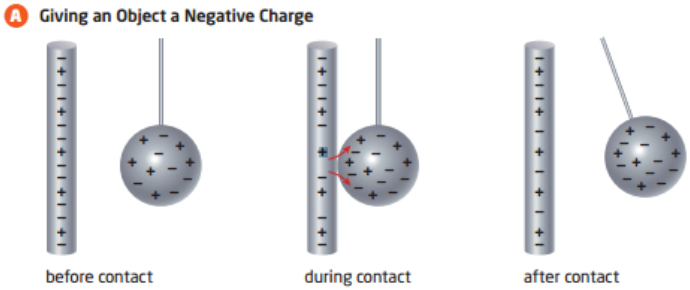
- **electric field** - the _____ around an object, where the effect of its charge can be felt by other objects.

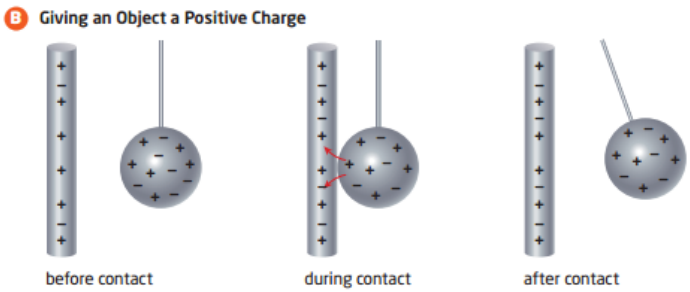


CHARGING BY CONTACT

When a charged object **touches** a neutral object, this causes the neutral object to become charged.

In both figures below, the sphere starts out neutral.





4. In Part A of the figure,

a. What was the charge of the rod **before** contact?

_____

b. What happens **during** contact? _____

_____

_____

5. **After** contact, what is the charge of:

a. the sphere? _____

b. the rod? _____

6. Describe what happens when a **positive** rod touches the neutral sphere. _____

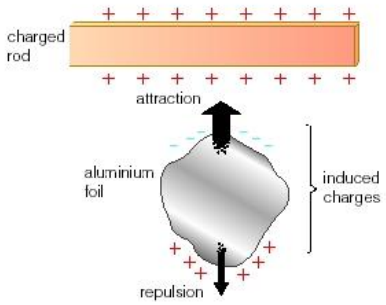
_____

_____

CHARGING BY INDUCTION

Charging by induction occurs when a charged object is brought near to, but **does not touch**, a neutral object.

7. Define: **induced charge separation -** the movement or _____ of electrons in a substance, caused by the electric field of a nearby object, without direct contact between the substance and the object.



8. a. The sphere below is neutral. Draw 5 (+) charges and 5 (-) charges to show that it is neutral.

(a)

b. Describe what happens when a negatively-charged rod is brought near the neutral sphere.

(b)

_____

_____

_____

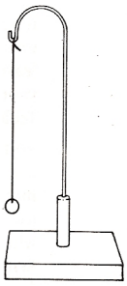
_____

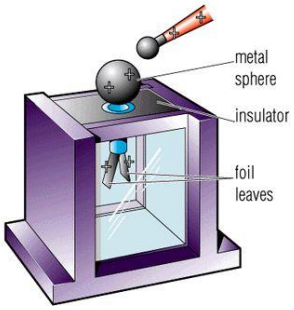
DETECTING STATIC CHARGES

9. What is an **electroscope**? _____

_____.

10. **Name** the two types of electroscope shown below:





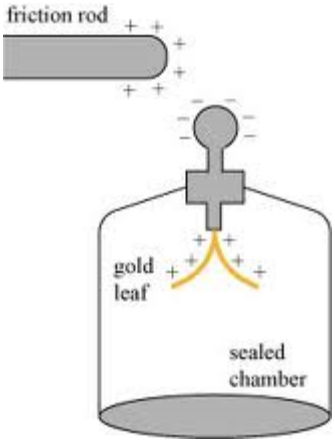
_____ _____

11. There are two situations that would cause the leaves of a metal leaf electroscope to spread apart. These are:

- _____
- _____

How the Metal Leaf Electroscope Works

12. When a charged object is brought **near** the conducting sphere of a metal leaf electroscope, the leaves separate. Use your knowledge of charging by induction, and the laws of electric charges, to explain why this happens. The picture below can help you.



a. When a positively-charged rod is brought towards the neutral sphere, the _____ charges in the sphere are repelled into the leaves. This is an example of an _____ charge separation.

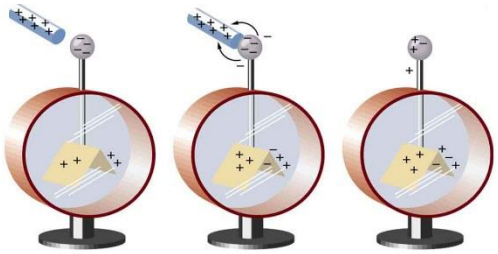
b. The leaves then separate because they are coated with _____ *(like/opposite)* charges.

13. a. If the positive rod actually **touched** the sphere, _____ charges would flow from the _____ to the _____. This is an example of charging by _____.

b. What charge would the electroscope then have? _____

c. Would the leaves still stay separated? Why or why not? _____

_____



SUMMARY

There are three methods of producing static charge:

A. _____ - Rubbing two neutral objects together

B. _____ - Touching a neutral object with a charged one

C. _____ - Bringing a charged object close to a neutral one

Homework

p. 415#1, 2; RQ p. 417 # 2-8