Name _____ Date _____

Honors Physics Electrostatics WS #5H

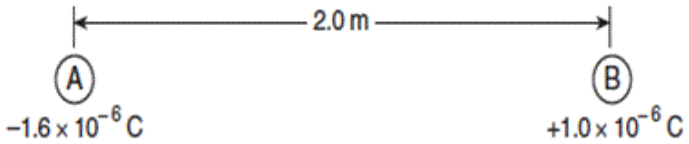
Period _____ Mrs. Nadworny

Conduction, Induction, and the Electroscope

1. A metal sphere, *X*, has an initial net charge of -6×10^{-6} coulomb and an identical sphere, *Y*, has an initial net charge of $+2 \times 10^{-6}$ coulomb. The spheres touch each other and then separate. What is the net charge on sphere *X* after the spheres have separated?

   (A) 0 C (B) -2 x 10^{-6} C (C) -4 x 10^{-6} C (D) -6 x 10^{-6} C

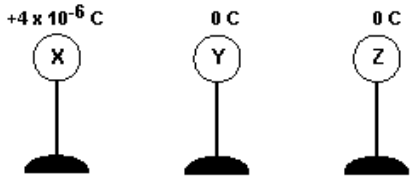
Base your answer to the question on the diagram below and on your knowledge of physics. The diagram represents two small, charged, identical metal spheres, *A* and *B* that are separated by a distance of 2.0 meters.



2. If the two spheres were touched together and then separated, the charge on sphere *A* would be

   (A) -3.0 x 10^{-7} C (B) -6.0 x 10^{-7} C (C) -1.3 x 10^{-6} C (D) -2.6 x 10^{-6} C

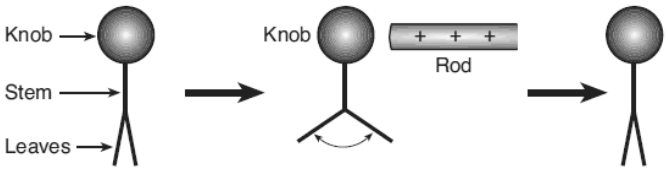
The diagram below shows the initial charge and position of three metal spheres, *X*, *Y*, and *Z*, on insulating stands. Sphere *X* is brought into contact with sphere *Y* and then removed. Then sphere *Y* is brought into contact with sphere *Z* and removed.



3. What is the charge on sphere *Z* after this procedure is completed?

   (A) +1 x 10^{-6} C (B) +2 x 10^{-6} C (C) +3 x 10^{-6} C (D) +4 x 10^{-6} C

The electroscope shown in the diagram below is made completely of metal and consists of a knob, a stem, and leaves. A positively charged rod is brought near the knob of the electroscope and then removed.



4. The motion of the leaves results from electrons moving from the

   (A) leaves to the knob, only
   (B) knob to the leaves, only
   (C) leaves to the knob and then back to the leaves
   (D) knob to the leaves and then back to the knob

5. When an isolated conductor is placed in the vicinity of a positive charge, the conductor is attracted to the charge. The charge of the conductor

   (A) must be positive
   (B) must be negative
   (C) could be neutral or positive
   (D) could be neutral or negative

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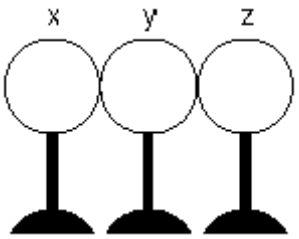
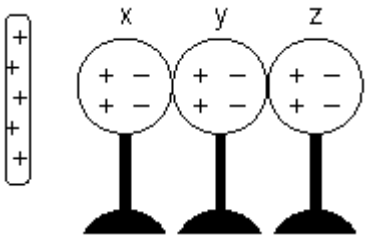
The diagram below shows three neutral metal spheres, *x*, *y*, and *z*, in contact and on insulating stands.

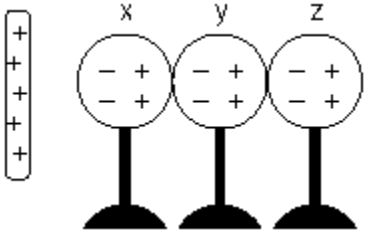


6. Which diagram best represents the charge distribution on the spheres when a positively charged rod is brought near sphere *x*, but does not touch it?

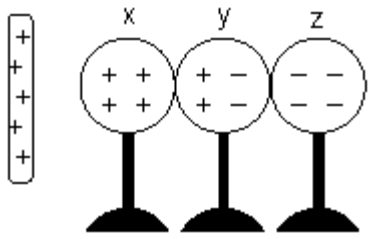
(A)



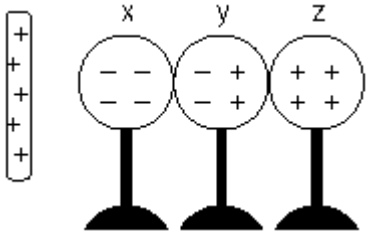
(B)



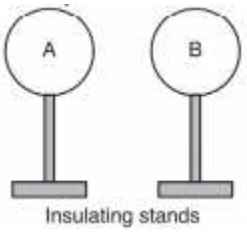
(C)



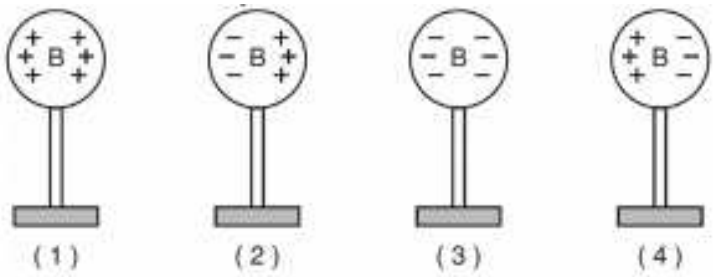
(D)



Two identically-sized metal spheres, A and B, are on insulating stands, as shown in the diagram below. Sphere A possesses an excess of 6.3×10^{10} electrons and sphere B is neutral.



7. Which diagram best represents the charge distribution on sphere B?



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8. Make a general statement describing the behavior of a neutral electroscope when a charged object is brought near to, but **not** touching, it.

9. Summarize how you can tell by using a test rod/strip whether an electroscope is positively or negatively charged.

10. Describe the major difference between the methods of conduction and induction regarding the actual method of charging the electroscope.

11. Compare the charge on the electroscope and the charge on the rod/strip that touched it when the electroscope was charged by the method of conduction.

12. Compare the charge on the electroscope and the charge on the rod/strip that came near it when the electroscope was charged by the method of induction.

13. A negatively charged rod is brought nearby a charged electroscope and the leaves of the electroscope return to their vertical position. What can you conclude about the electroscope?

14. If an electroscope is neutral and then when a rod is brought nearby the leaves separate, what can you conclude about the rod?