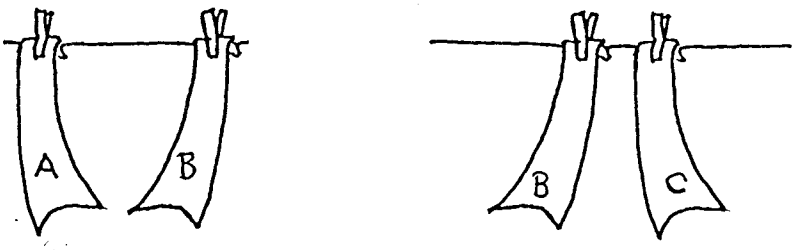
1. Peter says: “An electrically neutral object does not contain any electric charges.”
   Rewrite the sentence and put it in an accurate and correct way.

2. Three electrically charged handkerchiefs A, B and C are reacting to each other as shown below:



   How do A and C react to each other?

3. Four electrically charged metal spheres A, B, C und D are hanging on insulating threads. By experimenting you find out the following: A repels B, A attracts C and C repels D.
   How does A react to D, B to C and B to D?

4. Two metal spheres of the same size carry different charges: sphere A carries the charge 1.0 mC and sphere B carries the charge –5.0 mC. The spheres are brought together, allowed to touch, and then separated.
   What is the magnitude of the charge on sphere A, what is the magnitude of the charge on sphere B, after separation?

5. Chad has just combed his hair with a plastic comb. Afterwards his comb repels a negatively charged sphere.
   What kind of charge does Chad's hair carry?

6. The charge which flows through the cross-sectional area of a wire within one minute amounts to 180.0 C.
   What's the magnitude of the electric current?

7. An electric current of 0.20 A flowed through the light bulb of a flashlight for ten minutes.
a) What's the magnitude of the charge that flowed?
b) How many electrons did flow through the light bulb?

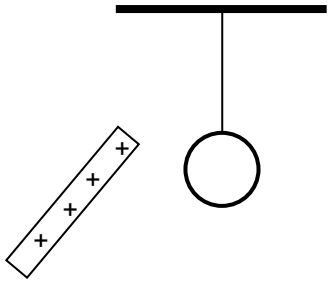
8. An electric current of 0.50 A flows through the cross-sectional area of a wire in a circuit.
a) How long does it take for a charge of 100.0 C to flow through?
b) How long does it take for 1'000'000'000 electrons to flow through?

9. Two materials are describing themselves. Which one is an electric conductor, which one is an electric insulator?
a) “My outer electrons are tightly bound and belong to particular atoms. However, by rubbing my surface it's possible to add or remove electrons - this is how I become charged.”
b) “My outer electrons are not strictly anchored to particular atoms. They can move freely between different atomic nuclei.”

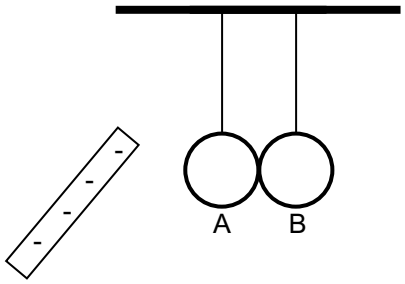
10. A charged rod approaches an electrically neutral metal sphere which is hanging from an insulating thread.

a) Draw the charge distribution on the sphere.

b) Does the sphere move away from the rod, or approach it, or does it stay where it is? Give reasons for your answer.

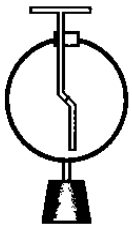


11.

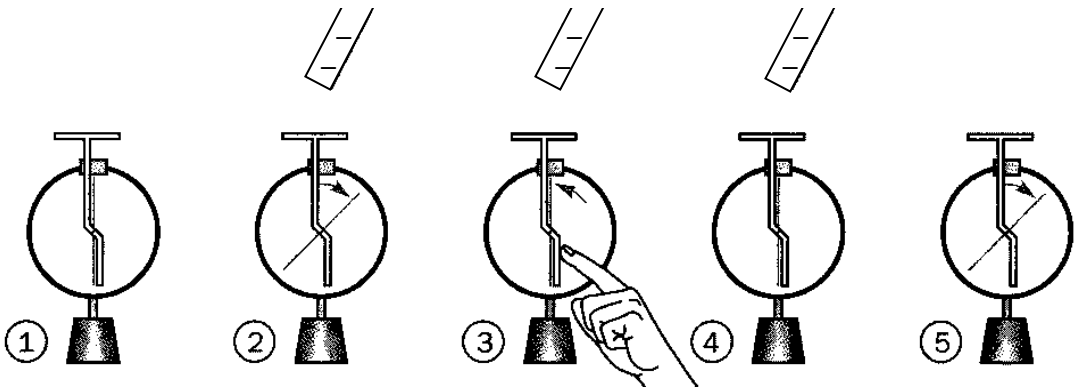


Two electrically neutral metal spheres are suspended on threads and touching each other. A negatively charged rod is placed nearby as shown in the picture. As the rod is kept close the spheres are separated. Then the rod is removed.
What kind of charges do the spheres A and B carry?
Hint: Sketch the charge distribution before the spheres are separated.

12. An electroscope carries negative charge. Draw the position of the pointer as well as the charge distribution.



13. Here you can see how an electroscope becomes charged. The rod never touches the electroscope. Sketch the charge distribution in each picture. What kind of charge does the electroscope carry in the end?



Solutions:
4. they both carry a charge of –2 mC
6. 3.0 A
7. a) 120 C b) $7.5 \cdot 10^{20}$ electrons
8. a) 3 min 20 s b) $3.2 \cdot 10^{-10}$ s