

Electricity Chapter Problems

1. A glass rod is rubbed with a piece of silk. During the process the glass rod acquires a positive charge and the silk

B. acquires a negative charge

2. A glass rod is rubbed with a piece of silk. When the glass rod is brought near a small piece of cork hanging by a thread, the cork is attracted to the rod. This is because

B. the cork becomes polarized

The cork has an effective separation of charge.

3. A positively charged rod is brought near a metal can, without touching the can. The can

A. remains neutral

If there is no contact, the can cannot become charged.

4. A positively charged rod is brought near a metal can, and then touches the can. The can

C. becomes positively charged

There is a transfer of charge via contact. Positive charges from the rod move to the can.

5. Two charged objects attract each other with a force F . If the charges on both objects are halved with no change in separation, the force between them

D. is one quarter as large

By coulomb's law...both charges are halved and $1/2$ times $1/2$ is $1/4$.

6. Consider two charges Q_1 and Q_2 , separated by a distance d . Imagine that the separation of the two charges is changed to $d/3$. The electric force between them...

E) is nine times greater

The force is inversely proportional to the square of the distance. So as distance changes to $d/3$, the force increases by a factor of nine, or 1 divided by $1/3$ squared.

7. Two charged objects attract each other with a force F . If the charges on both objects are halved and, at the same time, the distance between the charges is also halved, the force between them is

E. remains the same

8. Two charged objects attract each other with a force F . If the one charge is doubled, the other charge is quadrupled and the distance between the charges is also doubled, the force between them is

B. doubled

This answer is based on Coulomb's law. On the 'top' of the fraction you have increased by a factor of 8, but on the bottom you increased by a factor of two squared, or four. Since $8/4$ is two, the overall fraction has doubled.

9. Two charges separated by 16 m exert a force on each other of 8 N ("N" stands for "newtons", the unit of force). If the charges are moved so that the force changes to 32 N, what is now the separation of the charges?

C. 8 m

10. Two charges exert a force on each other of 2 N . If one of the charges is replaced by a charge that is 4 times bigger, the force becomes...

C. 8 N

11. Two charges exert a force on each other of 2 N . If both charges are replaced by a charge that is 4 times bigger, the force becomes...

E. 32 N

12. Two charged objects attract each other with a force $F = 2$ N. If one charge is quadrupled, the other charge is halved, and the distance between the charges is reduced by a factor of four, the force between them changes to

D. 16 N

13. A positively charged rod is brought near a metal sphere without touching it. While the rod is held near the sphere, the sphere is grounded briefly (by touching a finger to the side closest to the rod). After the glass rod is removed, the metal sphere

B. is negatively charged

The positive charges in the sphere try to get as far from the rod as possible... which means moving onto the surface of the large human conductor. Thus the rod is left with a negative charge.

14. A negatively charged rod is brought near a metal sphere without touching it. While the rod is held near the sphere, the sphere is grounded briefly (by touching a finger to the side closest to the rod). After the glass rod is removed, the metal sphere

C. is positively charged

The negative charges in the sphere try to get as far from the rod as possible... which means moving onto the surface of the large human conductor. Thus the rod is left with a positive charge.