Name **Period:**

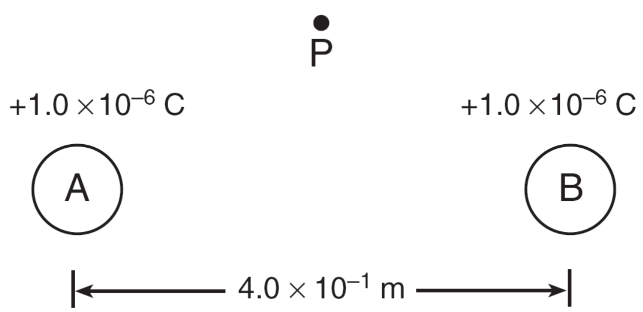
Charges and Coulombs Law

1. What is the magnitude of the electrostatic force between two electrons separated by a distance of 1.00×10^{-8} meter?

A) 2.56×10^{-22} N B) 2.30×10^{-20} N
C) 2.30×10^{-12} N D) 1.44×10^{-1} N

2. Base your answer to the following question on the information and diagram below.

Two small metallic spheres, *A* and *B*, are separated by a distance of 4.0×10^{-1} meter, as shown. The charge on each sphere is $+1.0 \times 10^{-6}$ coulomb. Point *P* is located near the spheres.



What is the magnitude of the electrostatic force between the two charged spheres?

A) 2.2×10^{-2} N B) 5.6×10^{-2} N
C) 2.2×10^{4} N D) 5.6×10^{4} N

3. What is the approximate electrostatic force between two protons separated by a distance of 1.0×10^{-6} meter?

A) 2.3×10^{-16} N and repulsive
B) 2.3×10^{-16} N and attractive
C) 9.0×10^{21} N and repulsive
D) 9.0×10^{21} N and attractive

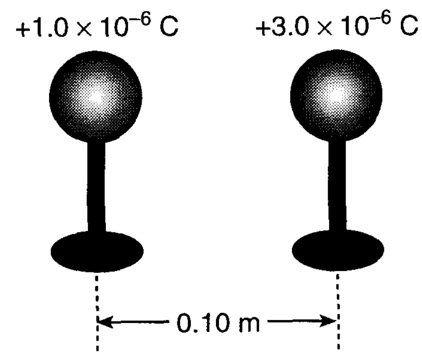
4. Two point charges attract each other with a force of 8.0×10^{-5} Newton. If the distance between the charges is doubled, the force will become

A) 16×10^{-5} Newton B) 2.0×10^{-5} Newton
C) 64×10^{-5} Newton D) 4.0×10^{-5} Newton

5. A glass rod is given a positive charge by rubbing it with silk. The rod has become positive by

A) gaining electrons B) gaining protons
C) losing electrons D) losing protons

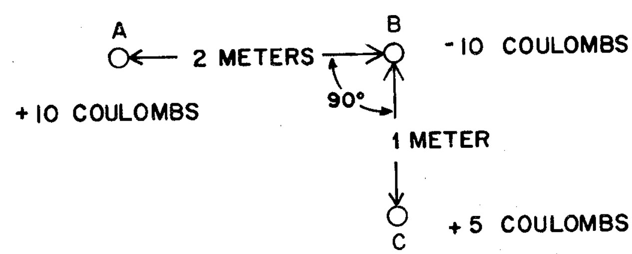
6. The diagram below shows two metal spheres charged to $+1.0 \times 10^{-6}$ coulomb and $+3.0 \times 10^{-6}$ coulomb, respectively, on insulating stands separated by a distance of 0.10 meter.



The spheres are touched together and then returned to their original positions. As a result, the magnitude of the electrostatic force between the spheres changes from 2.7 N to

A) 1.4 N B) 1.8 N C) 3.6 N D) 14 N

7. The diagram shows three small metal spheres with different charges.



Compared to the force between spheres *A* and *B*, the force between spheres *B* and *C* is

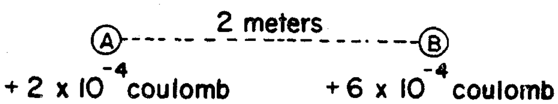
A) one-quarter as great
B) twice as great
C) one-half as great
D) four times as great

8. Two metal spheres having charges of $+4.0 \times 10^{-6}$ coulomb and $+2.0 \times 10^{-5}$ coulomb, respectively, are brought into contact and then separated. After separation, the charge on each sphere is

A) 8.0×10^{-11} C B) 8.0×10^{-6} C
C) 2.1×10^{-6} C D) 1.2×10^{-5} C

9. Base your answer to the following question on the information and diagram below.

Two conducting spheres, *A* and *B*, are separated by a distance of 2 meters between centers. Sphere *A* has a charge of $+2 \times 10^{-4}$ coulomb, and sphere *B* has a charge of $+6 \times 10^{-4}$ coulomb.



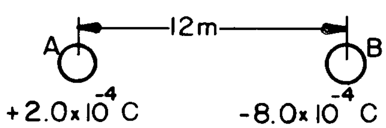
The force that these two spheres exert upon each other is

A) 9.0×10^{9} N B) 5.4×10^{2} N
C) 3.0×10^{-8} N D) 2.7×10^{2} N

10. When a plastic rod is rubbed with wool, the wool acquires a positive charge because

A) electrons are transferred from the wool to the rod
B) protons are transferred from the wool to the rod
C) electrons are transferred from the rod to the wool
D) protons are transferred from the rod to the wool

Base your answers to questions **11** through **13** on the diagram below which represents a system consisting of two charged metal spheres with equal radii.



11. What is the magnitude of the electrostatic force exerted on sphere *A*?

A) 1.1×10^{-9} N B) 1.3×10^{-8} N
C) 120 N D) 10. N

12. If spheres *A* and *B*, as represented in the diagram, were touched together and then separated, the net charge on the two spheres would

A) decrease B) increase
C) remain the same

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

A) -6.0×10^{-4} C B) 2.0×10^{-4} C
C) -3.0×10^{-4} C D) -8.0×10^{-4} C

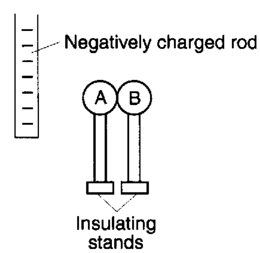
14. If an object has a net negative charge of 4.0 coulombs, the object possesses

A) 6.3×10^{18} more electrons than protons
B) 2.5×10^{19} more electrons than protons
C) 6.3×10^{18} more protons than electrons
D) 2.5×10^{19} more protons than electrons

15. Which quantity of excess electric charge could be found on an object?

A) 6.25×10^{-19} C
B) 4.80×10^{-19} C
C) 6.25 elementary charges
D) 1.60 elementary charges

16. Two electrically neutral metal spheres, *A* and *B*, on insulating stands are placed in contact with each other. A negatively charged rod is brought near, but does not touch the spheres, as shown in the diagram below.



How are the spheres now charged?

A) *A* is positive and *B* is positive.
B) *A* is positive and *B* is negative.
C) *A* is negative and *B* is positive.
D) *A* is negative and *B* is negative.

17. A wool cloth becomes positively charged as it

A) gains protons B) gains electrons
C) loses protons D) loses electrons

Base your answers to questions **18** and **19** on the diagram below which shows two identical metal spheres. Sphere *A* has a charge of +12 coulombs and sphere *B* is a neutral sphere.

18. When spheres *A* and *B* are separated, the charge on *A* will be

A) +12 coulombs
B) 1/4 the original amount
C) 1/2 the original amount
D) 4 times the original amount

19. When spheres *A* and *B* come into contact, sphere *B* will

A) gain 6 coulombs of protons
B) lose 6 coulombs of protons
C) gain 6 coulombs of electrons
D) lose 6 coulombs of electrons

20. In the charging of a solid, charge transfer is accomplished by the displacement of

A) electrons, only
B) protons, only
C) both electrons and protons
D) neither electrons nor protons