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Electric Charge, Force, and Field Problems (Practice Questions)

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Electric Charge Problems

1. Find the total positive charge of all the protons in 1.0 mol of water. [9.632 *10^5 C]

2. Find the total positive charge of all the protons in 5 gm of water. [2.676x10^5]

3. What would be the net charge of 1.0 gram gold piece after removal of 1.0% of its electrons? [386.336 C]

4. A balloon, initially neutral, is rubbed with fur until it acquires a net charge of -0.60nC. (a) Assuming that only electrons are transferred, were electrons removed from the balloon or added to it? (b)How many electrons were transferred? [3.7 * 10^9]

5. A metallic sphere has a charge of +4.0 nC. A negatively charged rod has a charge of -6.0 nC. When the rod touches the sphere, 8.2 x 10^9 electrons are transferred. What are the charges of the sphere and the rod now? [Sphere = 2.688 nC and Rod=-4.688 nC]

Electric Force Problems

6. Two charges, 5 C and 15 C are separated by 10 cm. What is the force between them? [6.75x10^13 N]

7. Two charges, 5 C and 15 C are separated by some distance. Force between them is 6.75x10^13 N. What is the distance between them in cm? [10 cm]

8. Two charges, one is 5 C and another is unknown but force between them is 6.75x10^13 N and they are separated by 10 cm. What is the other charge? [15 C]

9. If the electrical force of repulsion between two 1-C charges is 10 N, how far apart are they? [30000 m]

10. If the electrical force of repulsion between two same amount of charges is 10 N, and they are 30000 m apart. What is the magnitude of each charge? [1C]

11. Two +1 C charges are separated by 30000 m, what is the magnitude of the force? [10 N]

12. A total charge of 7.50 x 10^{-6} C is distributed on two different small metal spheres. When the spheres are 6.00 cm apart, they each feel a repulsive force of 20.0 N. How much charge is on each sphere? [1.067 micro coulomb and]

13. 13. How many electrons must be removed from each of two 5.0-kg copper spheres to make the electronic force of repulsion between them equal in magnitude to the gravitational attraction between them? [2.675*10^9]

14. 14. What is the ratio of the electric force to the gravitational force between a proton and an electron separated by 5.3 x 10^{-11} m (the radius of a hydrogen atom)? [2.2911*10^39]
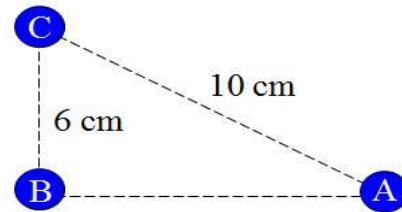
15. Three point charges are fixed in place in a right triangle. What is the electric force on the 5.0 µC charge due to the other two charges? [74N]

16. 16. Find the force on 1 µC charge? [64.0312 N]

17. Find the force on -4 µC charge?
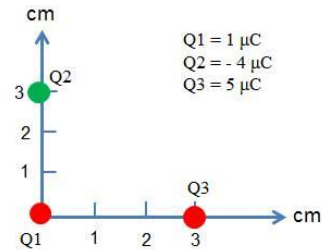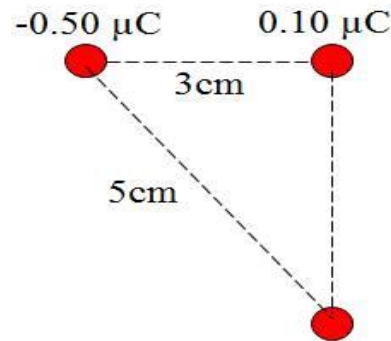

18. Three charges A(4 µC), B(-6 µC) and C(2 µC) are placed at the vertices of a right angle triangle ABC. AC=10 cm, BC=6 cm. Find net force on charge B due to C and A charges.

19. Three point charges are fixed at the corners of a right triangle. What is the electric force on the +1.0-µC charge due to the other two charges?


20. 3 charges, 1.0 µC each, are placed in 3 corners of a square A, B, C. Calculate the charge located at point D so that the net force on charge at B will be zero. [-2.83 micro Coulomb]
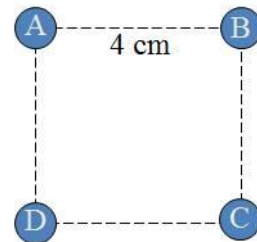

21. 3 charges, 1.0 µC each, are located on three vertices A, B, C of an equilateral triangle with sides 2 cm each. Another charge **q** is located at the mid point of the side BC. Calculate **q** so that net force on the charge at A due to the charges at B, C and D is zero.
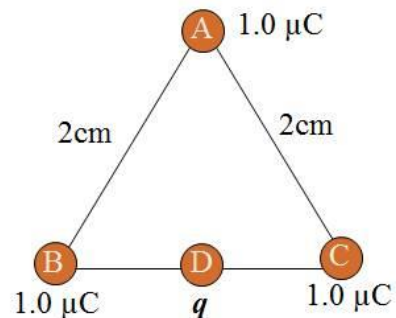
22. Two pith balls with the same mass $m = 9.0 \times 10^{-8}$ kg and the same positive charge Q are suspended from the same point by insulating threads of length $L = 0.98$ m. What is the charge Q? Assume the angle between the thread θ is 30 degree [2.6 nC]
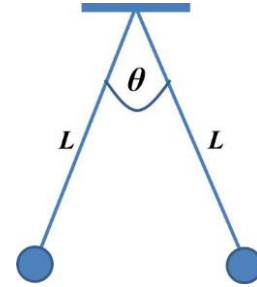
23. Three point charges are placed on the x-axis. A charge of 3.00 μC is at the origin. A charge of -5.00 μC is at 20.0 cm, and a charge of 8.00 μC is at 35.0 cm. What is the force on the charge at the origin? [1.615 N in +x direction]

24. Three point charges 1.0 μC, 0.10 μC and 10.0 μC are placed on a straight line and net force on 0.10 μC is *zero*. Find *x* in cm. [9.4868 cm]
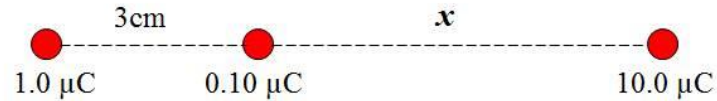
Electric Field Problems

25. Two point charges, q_1= +20.0 nC and q_2= +10.0 nC, are located on the x-axis at x= 0 and x=1.00 m, respectively. Where on the x-axis is the electric field will be zero? [0.585 m from +20 nC]

26. 23. Two point charges, q_1= -20.0 nC and q_2= +10.0 nC, are located on the x-axis at x= 0 and x=1.00 m, respectively. Where on the x-axis is the electric field will be zero? [2.4143 m from +10 nC]

27. 24. Two point charges, q_1= +20.0 nC and q_2= -10.0 nC, are located on the x-axis at x= 0 and x=1.00 m, respectively. Where on the x-axis is the electric field will be zero? [2.43 m from -10 nC charge]

28. Two equal charges, +10.0 nC each, are located on the x-axis at x= 0 and x=1.00 m, respectively. What is the magnitude of electric field at the point x= 0.50 m? [0 N/C]

29. Positive point charges, 1 µC each, are placed at three corners of a rectangle, as shown in the figure. (a) What is the electric field at the forth corner? [3.06*10^15] (b) A small object with a charge of +2.0 µC is placed at the forth corner. What force acts on the object? [6.12x10^9 N]
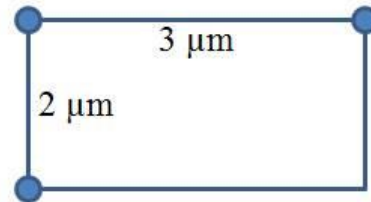
30. Two equal charges (Q= +1.00 nC) are situated at the diagonal corners A and C of a square of side 1.0 m. What is the magnitude of the electric field at point D? [12.73 N/C]

31. 2 charges 5 nC and 10 nC are placed at A and B. Find a point C on AB such that electric field is zero at C. AB=2m [zero electric field is 0.829 m far from 5 nC charge OR zero electric field is 2-0.829 m far from 10 nC charge]

32. 10 nC charge is located at point A (0, 6cm). Calculate the x component of the electric field at the point P (6cm,0) [8829.01 N/C]

33. -10 nC charge is located at (0,0) point. Calculate the y component of electric field at point P (4cm, 5cm). [-17157.72 N/C]