OldExams-Chapter 21

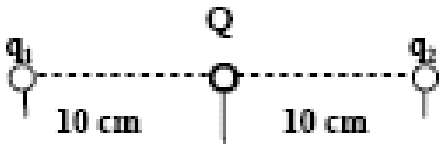
081

Q1. Particle 1 with charge q_1, and particle 2 with charge q_2 are on the x axis, with particle 1 at $x = 4.0$ cm and particle 2 at $x = -2.0$ cm. Find the relationship between q_1 and q_2 so that the net force on a third particle of charge q located at the origin, be zero, (Ans: $q_2 = q_1 / 4$)

Q2. A particle with charge 2.0 μC is placed at the origin, an identical particle, with the same charge, is placed 2.0 cm from the origin on the positive x axis, and a third identical particle, with the same charge, is placed 2.0 cm from the origin on the positive y axis. The magnitude of the force on the particle at the origin is: (Ans: 1.3×10^2 N)

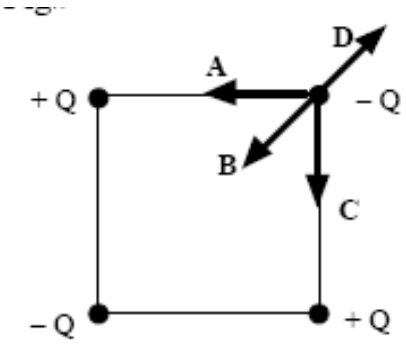
072

Q2. In the figure 1, charge Q = - 3.7 nC. For what value of charge q1 will charge q2 be in static equilibrium? (Ans: 15 nC)

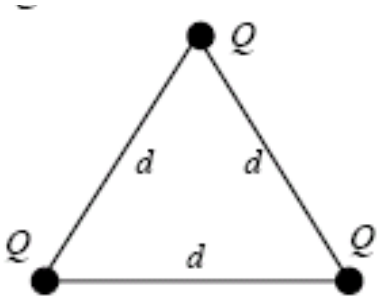


T071

Q15. Four point charges, each of the same magnitude, with varying signs are arranged at the corners of a square as shown in the figure 1. Which of the arrows labeled **A**, **B**, **C**, and **D** gives the correct direction of the net force that acts on the charge at the upper right corner? (Ans: B)



Q16. Three identical point charges, *Q*, are placed at the corners of an equilateral triangle as shown in the figure 2. The length of each side of the triangle is *d*. Determine the magnitude and direction of the total electrostatic force on the charge at the top of the triangle. (Ans: $\sqrt{3}k\,Q^2/d^2$ directed upward)



Q18. Consider two conducting spheres, **A** and **B**, having the same size. Sphere **A** carries a charge of −2.0 μC and sphere **B** carries a charge of + 6.0 μC. The spheres are touched together and then separated. What is the final charge on sphere A? (Ans: + 2.0 μC.)

T062

Q1. Two point charges $q_1 = +2.0 \times 10^{-6}$ C and $q_2 = -8.0 \times 10^{-6}$ C are located at (0.0, 0.0) cm and (10.0, 0.0) cm, respectively. Another positive point charge q_3 is to be located somewhere, on x-axis, such that the net electrostatic force on it due to q_1 and q_2 is zero. Its location will be: Ans (–10.0,0.0)

T061

Q1. Two identical positively charged ions are separated from each other by a distance of 6.8×10^{-9} m. If the electrostatic force between them is 4.5×10^{-9} N, how many electrons are missing from each ion? (Ans: 30)

Q2. A charge *q* is placed at the center of the line joining two equal charges *Q*. All charges will be in equilibrium if *q* is equal to: (Ans: $-Q/4$)

T052

Q5. Consider the charges shown in figure 1. Find the magnitude and sign of charge Q_4 so that the net electrostatic force on charge Q_5 is zero. (Ans: + 1.8 nC)

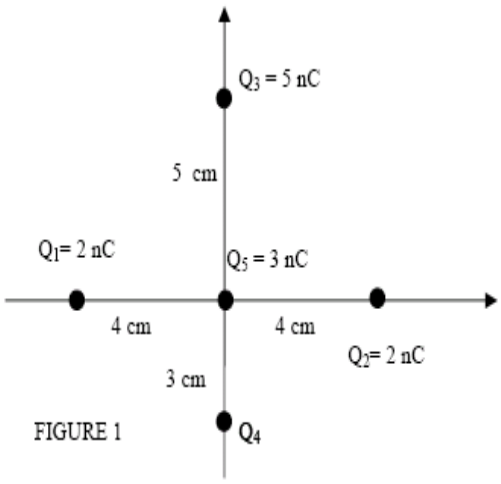


FIGURE 1

Q10. Which of the following charge **CANNOT** be found in nature? (Ans: 0.8×10^{-19} C)

Q12. Two small identical conducting spheres, initially uncharged are separated by a distance of 1.0 m. Find the number of electrons that must be transferred from one sphere to the other in order to produce an attractive force of $2x10^4$ N between the spheres. (Ans: 9.3×10^{15})

T051

Q1. Consider three charges on the x-axis: q1= 2.0 μC located at x1 = 0.0 m, q2 located at x2 = 4.0 m and q3 = – 1.0 μC located at x3= 6.0 m. What is the value of q2 such that the force on q3 is zero? (Ans: q2 = – 0.22 μC.)

Q2. Consider two identical conductor spheres, S1 and S2. Initially, sphere S1 has a charge of -40 μC and Sphere S2 has a charge of +20 μC. If the spheres are touched together and then separated by a distance of 0.20 m, what is the resultant force between them? (Ans: 23 N, repulsive.)

T042

Q1. Two positively charged particles q1 and q2 (with q2>q1) are fixed in place on the x-axis at the positions shown in figure 1. A third charge q3 is to be placed somewhere on the x-axis such that the net electrostatic force on q3 is zero. Which one of the following statements is TRUE? (Ans: q3 should be placed at a point between q1 and q2 but closer to q1)

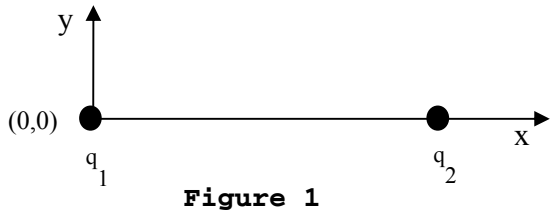


Figure 1

Q2. Two 1.0 g spheres are charged equally and placed 2.0 cm apart. When released, each one begins to accelerate at 225 m/s^2. What is the magnitude of the charge on each sphere? (Ans: $1.0x10^{-7}$ C.)

T041

Q1. What is the electric force between two protons which are separated by $1.6x10^{-15}$ m. (Ans: 90 N, repulsive.)

Q2. Two positive charges (+8.0 C and +2.0 C) are separated by 300 m. A third charge is placed a distance r from the +8.0 C charge so that the resultant electric force on the third charge due to the other two charges is zero. The distance r is (Ans: 200 m.)

T032

Q1. In figure 3, Q = 60 μC, q = 20 μC, a = 3.0 m, and b = 4.0 m. Calculate the total electric force on q. [i and j are the unit vectors in the positive direction of x-axis and y-axis, respectively]. (Ans: 0.69 i (N))

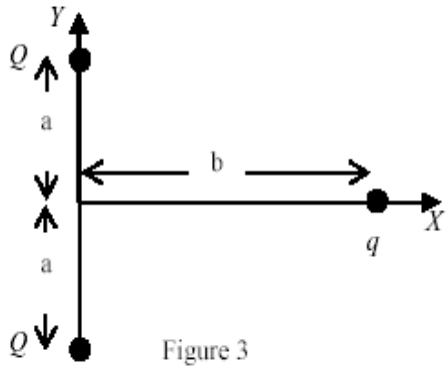


Figure 3

T031

Q1. As in figure (1), a charge Q is fixed at each of two opposite corners of a square. A charge q is fixed at each of the other two corners. If the resultant electrical force on Q is zero, then Q and q are related as: (Ans: Q = – 2 √2 q)

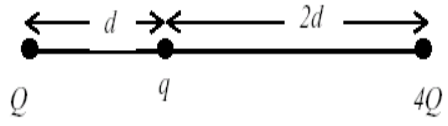


Figure 1

Q2. Consider two identical conductor spheres, A and B. Initially, sphere A has a charge of -80 Q and Sphere B has a charge of +20 Q. If the spheres touched and then are separated by a distance of 0.3 m, what is the resultant force between them? [Take Q = 5.7×10^{-8} C] (Ans: 0.3 N.)