Electric Force and Field Worksheet

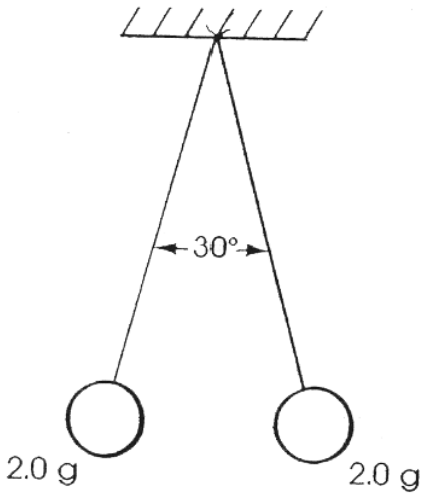
1. Two charged spheres 10 cm apart are attracted to each other with an electrical force of 3.0×10^{-6} N. What happens to the force between the spheres if
   (a) both charges are doubled and the distance remains the same. (1.2×10^{-5} N)
   (b) one of the charges is halved. (1.5×10^{-6} N)
   (c) the separation is increased to 30 cm. (3.3×10^{-7} N)

2. Calculate the force between charges of 5.0×10^{-8} C and 1.0×10^{-7} C if they are 2.0 cm apart. (1.8×10^{-2} N)

3. Two charged spheres, Q and 2Q, placed 4.0 cm apart, are attracted to each other with a force of 1.2×10^{-9} N.. Calculate the magnitude of the charge on each sphere. (1.0×10^{-11} C and 2.0×10^{-11} C)

4. Two equal charges of 1.1×10^{-7} C experience an electrostatic force of 4.2×10^{-4} N. How far apart are the centers of the two charges? (0.51 m)

5. Two identical, small spheres of mass 2.0 g are fastened to the ends of a 0.60 m long fishing line of negligible mass. The fishing line is suspended by a hook in the ceiling at its exact center. When the spheres are each given an identical electric charge, they separate as shown:



   Calculate the magnitude of the charge on each sphere. (2.4×10^{-7} C)

6. Three negatively charged spheres, each with a charge of -4.0×10^{-5} C, are fixed at the vertices of an equilateral triangle whose sides are 20.0 cm long. Calculate the magnitude and direction of the net electric force on each sphere. (624 N pointing outward)

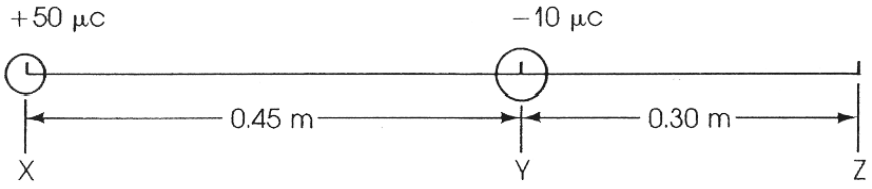
7. Three objects of charge -4.0×10^{-6} C, -6.0×10^{-6} C and $+9.0 \times 10^{-6}$ C are placed in a line spaced equally with a distance 0.50 m between them. Calculate the magnitude and direction of the net force acting on each charge. (0.54 N left, 2.8 N right, 2.3 N left)

8. Two small spheres with charges 1.6×10^{-5} C and 6.4×10^{-5} C are 2.0 m apart. Where, on the line joining the spheres, should a third charged sphere of charge -3.0×10^{-6} C be placed such that it experiences no net electrical force? (0.67 m from the 1.6×10^{-5} C charge)

9. A charge of -2.4×10^{-5} C experiences an electric force of 3.2 N to the left. What is the magnitude and direction of the electric field at that point? (1.3×10^{6} N/C right)

10. Calculate the electric force exerted on a point charge of 2.05×10^{-7} C, located in an electric field of 12 N/C to the right. (2.46×10^{-7} N to the right)

11. Two charges are placed as shown:



Calculate the electric field at point Z. (2.0×10^{5} N/C left)

12. Two parallel plates are separated by a distance of 1.0×10^{-6} m. If the potential difference between the plates is 30.0 V, what is the electric field between the two plates? (3.0×10^{7} N/C)