Chapter 25

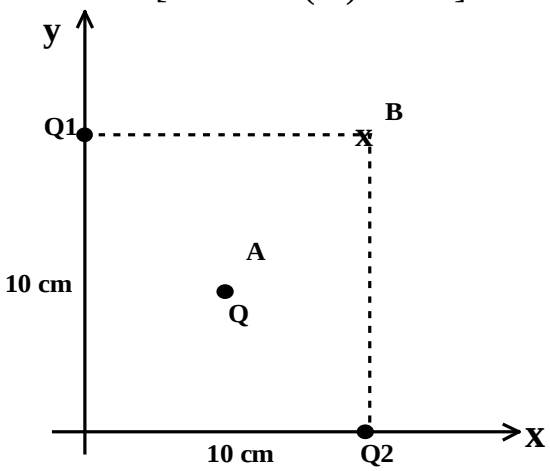
1- An infinite nonconducting sheet has a surface charge density 0.10*10**(-6) C/m**2 on one side. How far apart are equipotential surfaces whose potentials differ by 90 V? [1.6 cm.]

2- Two equal charges, each of 0.12 C, are separated by a distance of 1.8 m. What is the work done, by an external agent, to bring a charge of 0.15 C from infinity to the midpoint between the two charges? [3.6*10**8 J.]

3- Consider a metallic sphere carrying a charge of 4.0*10**(-8) C and having a potential of 400 V. Find the diameter of the sphere.. [1.8 m.]

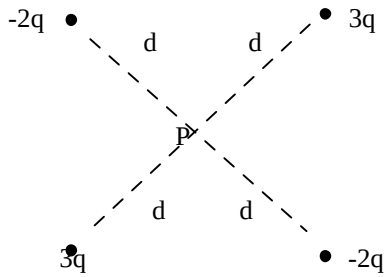
4- What is the external work required to bring four 2.0*10**(-9) C point charges from infinity and to place them at the corner of a square of side 0.14 m? [1.4*10**(-6) Joule.]

5- In figure, Q1 = 2.0*10**(-6) C and Q2 = - 2.0*10**(-6) C. What is the external work needed to move a charge Q = - 4.0*10**(-6) C at constant speed from point A at the center of the square to point B at the corner? [Zero.]



6- The electric potential at points in the xy–plane is given by: V = (x**3 - 2*x*y) Volts, where x and y are in meters. The magnitude of the electric field at the point with the coordinates x = 1 m and y = 2 m is: [Sqrt(5) V/m.]

7- In figure, what is the net potential at point P due to the four point charges if V = 0 at infinity ? [take d = 2 cm, q = 1.0 micro-C]. [9.0*10**5 V.]



8- Two balls with charges 5.0 micro-C and 10 micro-C are at a distance of 1.0 m from each other. In order to reduce the distance between them to 0.5 m the amount of work to be performed is: [0.45 J.]

9- Find the electrostatic potential at x = 0 for the following distribution of charges:-2q at x= 10 cm and -2q at x= -10 cm. [Take q = 1.0*10**(-9) C, and the electrostatic potential at infinity = 0] [-360 V.]

10- Three point charges are initially infinitely far apart. Two of the point charges are identical and have charge Q. If zero net work is required to assemble the three charges at the corners of an equilateral triangle of side d, then the value of the third charge is [- Q/2.]

11- Consider two concentric conducting shells of radii (a) and (b), b > a. The smaller (inner) shell has a positive charge (q) and the larger (outer) shell has a charge (Q). If the potential of the inner shell is zero, what is the value of Q? [Q = -b*q/a.]