

Chapter 24 (Electric Potential)

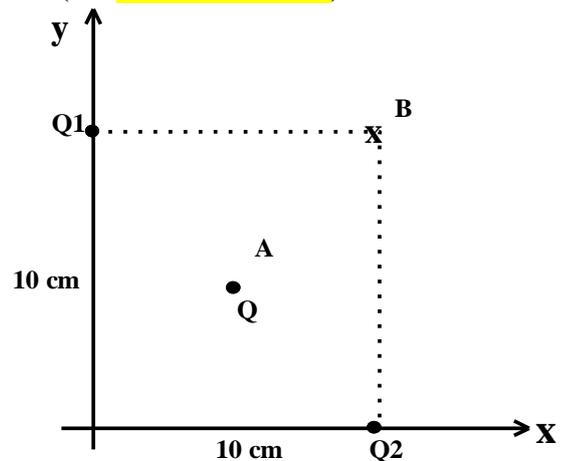
1- An infinite nonconducting sheet has a surface charge density $0.10 \times 10^{-6} \text{ C/m}^2$ on one side. How far apart are equipotential surfaces whose potentials differ by 90 V? (A: 1.6 cm)

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? (A: $3.6 \times 10^8 \text{ J}$)

3- Consider a metallic sphere carrying a charge of $4.0 \times 10^{-8} \text{ C}$ and having a potential of 400 V. Find the diameter of the sphere. (A: 1.8 m)

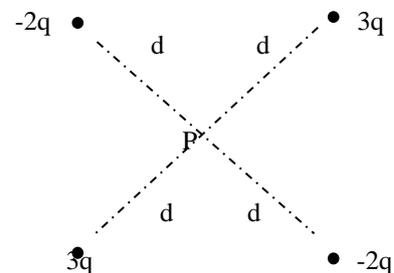
4- What is the external work required to bring four $2.0 \times 10^{-9} \text{ C}$ point charges from infinity and to place them at the corner of a square of side 0.14 m? (A: $1.4 \times 10^{-6} \text{ Joule}$)

5- In figure, $Q_1 = 2.0 \times 10^{-6} \text{ C}$ and $Q_2 = -2.0 \times 10^{-6} \text{ C}$. What is the external work needed to move a charge $Q = -4.0 \times 10^{-6} \text{ C}$ at constant speed from point A at the center of the square to point B at the corner? (A: Zero)



6- The electric potential at points in the xy -plane is given by: $V = (x^3 - 2xy) \text{ Volts}$, where x and y are in meters. The magnitude of the electric field at the point with the coordinates $x = 1 \text{ m}$ and $y = 2 \text{ m}$ is: (A: $\text{Sqrt}(5) \text{ V/m}$)

7- In figure, what is the net potential at point P due to the four point charges if $V = 0$ at infinity? [take $d = 2 \text{ cm}$, $q = 1.0 \text{ micro-C}$]. (A: $9.0 \times 10^5 \text{ V}$)



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: (A: 0.45 J)

9- Find the electrostatic potential at $x = 0$ for the following distribution of charges: $-2q$ at $x = 10 \text{ cm}$ and $-2q$ at $x = -10 \text{ cm}$. [Take $q = 1.0 \times 10^{-9} \text{ C}$, and the electrostatic potential at infinity = 0]. (A: -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: (A: $-Q/2$)

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 ? (A: $Q = -b q/a$)