

Class 12 (Physics)**Sheet 1A (Electrostatics)**

1	Five point charges, each of value $+q$ coulomb are placed on 5 vertices of a regular hexagon of side L meters. Find the magnitude of force on a charge $-q$ coulomb placed at the center of the hexagon.
2	Four particles, each having a charge q , are placed on the vertices of a regular pentagon. The distance of each Corner from the Centre is a . Determine the electric field at the Centre of the Pentagon.
3	A Charge Q is placed at each of the opposite corners of a square. A charge of q is placed at each of the other two corners. (a) If the resultant force on Q is zero, how are Q and q related? (b) Could q be chosen to make the resultant force on every charge zero?
4	Two pieces of copper each weighing 10 grams are placed at a distance of 10 cm from each other. One electron from per 1000 atoms of one piece is transferred to the other piece of copper. What will be the coulomb force between the two pieces after the transfer of electrons? The atomic mass of copper is 63.5 grams per mole. Avogadro number 6×10^{23} , charge on electron $e = 1.6 \times 10^{-19} \text{C}$.
5	Two equally charged identical spheres A and B repel each other with a force of $2 \times 10^{-5} \text{N}$. Another identical uncharged sphere C is touched to A, then placed at the midpoint between A and B. What is the net electrostatic force on C?
6	A copper ball of density 8.6g/cm^3 , 1 cm in diameter is immersed in oil of density 0.8g/cm^3 . What is the charge on the ball, if it remains just suspended in the oil in an electric field of intensity 3600V/m acting in the upward direction?
7	A charged dust particle of radius $5 \times 10^{-7} \text{m}$ is located in a horizontal electric field having an intensity of $6.28 \times 10^5 \text{V/m}$. The surrounding medium is a with coefficient of viscosity $\eta = 1.6 \times 10^{-5} \text{Ns/m}^2$. If the particle moves with a uniform horizontal speed of 0.02m/sec , find the number of electrons on it.
8	Two identical charged spheres are suspended by Strings of equal lengths. The strings makes an angle of 30° with each other. When suspended in a liquid of density 800grams/m^3 , the angle remains the same. What is the dielectric constant of medium? The density of the material of the sphere is 1600kg/m^3 .
9	An inclined plane makes an angle of 30 degree with the horizontal is placed in a uniform horizontal electric field of 100V/m . A particle of mass 1 kilogram and charge 0.01C is allowed to slide down from rest from a height of 1m. If the coefficient of friction is 0.2, find the time it will take for the particle to reach the bottom.
10	A ball of mass 10^{-2}kg and having charge $+3 \times 10^{-6} \text{C}$, is tied at one end of a 1m long thread. The other end of the thread is fixed and a charge $-3 \times 10^{-6} \text{C}$ is placed at this end. The ball can move in the circular orbit of radius 1 m in the vertical plane. Initially, the ball is at the bottom.

Find the minimum horizontal velocity of the ball so that it will be able to complete the full circle.