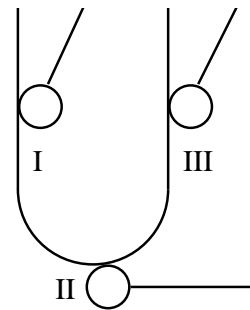


Part I

- When $+3.0\text{ C}$ of charge moves from point A to point B in an electric field, the potential energy is decreased by 27 J . It can be concluded that point B is
 - 9.0 V lower in potential than point A.
 - 9.0 V higher in potential than point A.
 - 81 V higher in potential than point A.
 - 81 V lower in potential than point A.
- One Coulomb is defined as the amount of charge that
 - produces an electric field of 1 volt/metre at a distance of 1 metre .
 - produces a potential of 1 volt at a distance of 1 metre .
 - when placed at each of two points which are separated by 1 metre produces a force of 1 newton .
 - flows passed a point in a circuit in 1 second when the current is 1 Ampere .
- Two charges $q_1 = Q$ and $q_2 = -2Q$ are placed on the x -axis at $x = 0\text{ m}$ and $x = 1\text{ m}$ respectively. The value of x when the electric field is zero lies in the interval
 - $x < 0$
 - $x > 0$
 - $0 < x < 1$
 - nowhere.
- A small uncharged ball touches a positively charged Faraday Ice Pail in one of the positions I, II, III. The ball will be charged after touching
 - only at positions II and III
 - only at position I
 - only at position II
 - at positions I, II, III
- A parallel plate capacitor has a capacitance of 50 pF in air and a capacitance of 110 pF in turpentine. The dielectric constant of turpentine is
 - 0.45
 - 0.55
 - 1.1
 - 2.2



Part II

1. Consider a uniformly charged insulating balloon.
 - (a) If the balloon is spherical is the field inside the balloon zero. Explain.

 - (b) If the balloon is sausage shaped is the field inside zero? Explain.

 - (c) Do your answers change if the balloon is coated with conductive paint before being charged?

2. A gold nucleus has a radius of 3×10^{-15} m and carries a charge of $79e$?
 - (a) What is the electric field strength at its surface?

 - (b) What is the potential at its surface?

 - (c) How much energy in electron volts would be required to bring a proton from a large distance up to the surface of the gold nucleus.

 - (d) What would the initial velocity of the proton need to be in order to come this close to the gold nucleus? (Assume the gold nucleus does not recoil.)