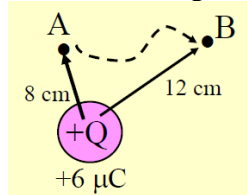
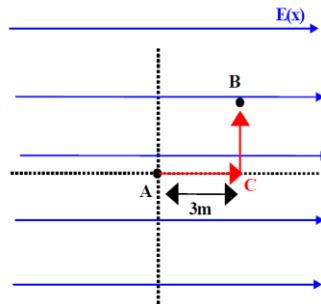


Electric Potential

1. Calculate the difference between the potential at $r = 5 \text{ cm}$ and $r = 10 \text{ cm}$ for a single point charge of 1 C located at the origin.
2. What are the equipotential surfaces of the uniformly charged sphere?
3. What is the potential energy if a $+2 \text{ nC}$ charge moves from ∞ to point A, 8 cm away from a $+6 \mu\text{C}$ charge?
4. What is the change in potential energy if a $+2 \text{ nC}$ charge moves from A to B?



5. What happens if we move a -2 nC charge from A to B.
6. Find the electric potential at the center of the equilateral triangle whose side is 1 m if there are three positive charges of 1 C , 2 C and 3 C in its corners. (Assume that $V(r)=0$ when r goes to infinity)
7. The potential difference between two parallel plates is 800 V . If their separation is 3 mm , what is the field, E ?
8. The potential along the x -axis is given by $V(x) = ax - bx^2$, where $a = 2 \text{ V/m}$ and $b = 1 \text{ V/m}^2$. At what value(s) of x (in m) is the electric field equal to zero?
9. The potential is given by $V(x, y) = a/(x^2 + y^2)$, where $a = 2 \text{ Vm}^2$. What is the magnitude of the electric field (V/m) at the point, $P(x, y) = (1 \text{ m}, 1 \text{ m})$?
10. A non-uniform electric field is given by $\vec{E}(x) = ax^2\hat{x}$, where $a = 10 \text{ V/m}^3$ as shown in the **Figure**. Point B lies at $x = y = 3 \text{ m}$ and point A is at the origin ($x = y = 0$). What is the potential difference $V_B - V_A$ (in Volts)?



11. Membrane walls of living cells have surprisingly large electric fields across them due to separation of ions. What is the voltage across an 8.00 nm -thick membrane if the electric field strength across it is 5.50 MV/m ? You may assume a uniform electric field.
12. An electron is to be accelerated in a uniform electric field having a strength of $2.00 \times 10^6 \text{ V/m}$. (a) What energy in keV is given to the electron if it is accelerated through 0.400 m ? (b) Over what distance would it have to be accelerated to increase its energy by 50.0 GeV ?

13. Two large, parallel conducting plates are 12 cm apart and have charges of equal magnitude and opposite sign on their facing surfaces. An electrostatic force of 3.9×10^{-15} N acts on an electron placed anywhere between the two plates. (a) Find the electric field at the position of the electron. (b) What is the potential difference between the plates?
14. An infinite non-conducting sheet has a surface charge density $\sigma = \frac{0.10 \mu\text{C}}{\text{m}^2}$ on one side. How far apart are equipotential surfaces whose potentials differ by 50V?