COULOMB'S LAW

1   Determine the electrical force that two protons in the nucleus of a helium atom exert on each other when separated by 2 x 10^{-15} m.   **[6.27 x 10^{-15} N]**

2   Find the electric force between two 5.00-C charges separated by 1.00 m.
   [2.25 x 10^{11} N]

3.   A charge q_1 = -6.5 μ C is at the origin, and a charge q_2 = -2.42 μ C is on the x axis at x = 1.00 m. Find the net force acting on a charge q_3 = +1.4 μ C located at x = 0.55 m.   **[-0.12 N]**

4.   The electron and proton of a hydrogen atom are separated (on average) by a distance of approximately 5.3 x 10^{-11} m. Find the magnitudes of the electric force between the two particles.   **[8.2 x 10^{-8} N]**

6   How many electrons should be removed from each of the two similar spheres each of 10 grams, so that the gravitational force balances electrostatic repulsion
   [5.38 x 10^6 electron]

7   Two-point charges 1x10^{-4} C and -1x10^{-4} C are placed at a distance of 40cm from each other. A charge of 6x 10^{-5} C is placed midway between them. What is the magnitude and direction of force on it?   **[F=2700 N].**
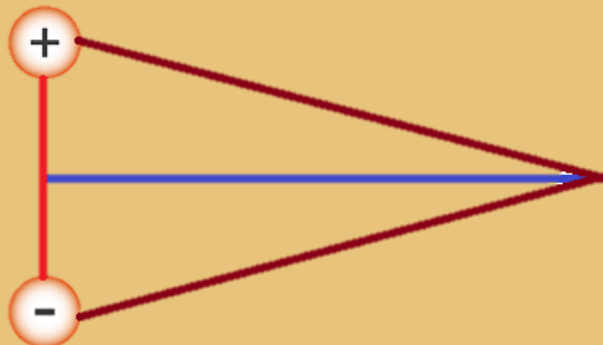
ELECTRIC FIELD

1   If the +2.80 μ C charge experiences a force of 0.21 N, what is the magnitude of the electric field?   **[7.5 x 10^4 N/C]**

2   What is the force on an electron at a point where the electric field is 5 X 10^5 N/C
   [8x10^{-14} N]

3   Find the electric field produced by a 2.9 μ C point charge at a distance of (a) 1.0 m and (b) 2.0 m.   **[2.6 x 10^4 N/C, 0.65 x 10^4 N/C]**

4   Two-point charges are separated by a distance of 10cm one has a charge of -25µC and the other +50µC. What is the direction and magnitude of the electric field at a point P between them, 2cm from the negative charge?   **[6.32 x 107 N/C]**

5   A water droplet of mass 3.0 x 10^{-12} kg is located in the air near the ground during a stormy day. An atmospheric electric field of magnitude 6.0 x 10^3 N/C points vertically downward in the vicinity of the water droplet. The droplet remains suspended at rest in the air. What is the electric charge on the droplet?   **[4.9 x 10^{-15} C]**

ELECTRIC FIELD AND ELECTRIC POTENTIAL

1. A proton of mass 1.67×10^{-27} kg and charge 1.6×10^{-19} is to be held motionless between two horizontal parallel plates 10cm apart. Find the voltage required to be applied between the plates   **[1.02 x 10⁻⁸ V]**

2. The electric potential difference between two parallel plates 4.2cm apart is 240V. What is the magnitude of the electric field between them?

   [5.71 x 10³ N/C]

3. The electric field between the parallel plates connected to a 45V battery is 1500V/m. How far apart are the plates?   **[0.030 m]**

4. An electron of charge 1.6×10^{-19} C is situated in a uniform electric field of intensity 1200-volt cm. Find the force on it, its acceleration, and the time it takes to travel 2 cm from rest (electronic mass, m, = 9.1 x 1031 kg).

   $$\left[1.92 \text{ x } 10^{-14}\ N\ ,\quad 2.109 \times 10^{16}\ m/s^2\ , 1.37 \times 10^{-9}\ s\right]$$

5. Two parallel plates are charged to voltage 50V of the separation between the plates is 50cm. Calculate the electric field between them.

ELECTRIC FIELD DUE TO DIPOLE

1. A proton and an electron from two corners of an equilateral triangle of side length 8×10^{-6} m. What is the magnitude of the net electric field of these two particles at the third corner?

2. Figure show two charges particle q = +6.4 x10⁻¹⁹ C and q =- 6.4 x10⁻¹⁹ C are separated by a distance 5m. What are the magnitude and direction of the net electric field at point P at $x = 8\ m$

3. A proton and an electron from two corners of an equilateral triangle of side length 6×10^{-6} m. What is the magnitude of the net electric field of these two particles at the third corner?