# Charge: Coulomb's law

1. A $+15~\mu C$ charge is located 40 cm from a $+3.0~\mu C$ charge. Find the magnitude of the electrostatic force on the larger charge and on the smaller charge (in N).

2. Two-point particles have charges q1 and q2 and are separated by a distance d. Particle q2 experiences an electrostatic force of 12 milliN due to particle q1. If the charges of both particles are doubled and if the distance between them is doubled, what is the magnitude of the electrostatic force between them (in milliN)?

3. Three-point charges lie along the $x$ axis as shown in Figure. The positive charge $q1 = 15.0~\mu C$ is at $x = 2.00$ m, the positive charge $q2 = 6.00~\mu C$ is at the origin, and the net force acting on $q3$ is zero. What is the $x$ coordinate of $q3$?
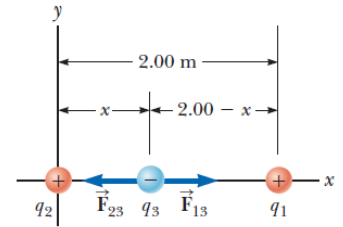
4. Consider three-point charges located at the corners of a right triangle as shown in Figure, where $q1$ & $q3 = 5.00~\mu C$, $q2 = 22.00~\mu C$, and $a = 0.100$ m. Find the resultant force exerted on $q3$.
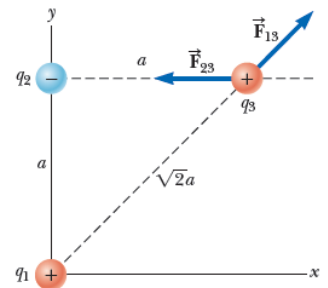
5. In Fig, two tiny conducting balls of identical mass $m$ and identical charge $q$ hang from nonconducting threads of length $L$. If $L = 120$ cm, $m = 10$ g, and $x = 5.0$ cm, what is $|q|$?
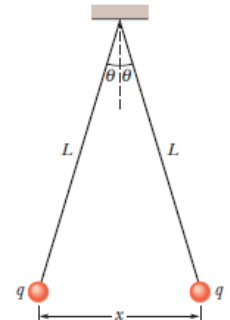
6. The nucleus in an iron atom has a radius of about $4.0 \times 10^{-15}$ m and contains 26 protons.
(a) What is the magnitude of the repulsive electrostatic force between two of the protons that are separated by $4.0 \times 10^{-15}$ m ?
(b) What is the magnitude of the gravitational force between those same two protons?

7. Point charge A has a charge of $-1.0$ nC, and point charge B has a charge of 4.0 nC. They are separated by 1.0 cm. What are the magnitude and direction of the electric forces on charges A and B?

8. Compute the ratio of the electric force to the gravitational force exerted by a proton on an electron in a hydrogen atom.

9. A small plastic sphere is charged to -10 nC. It is held 1.0 cm above a small glass bead at rest on a table. The bead has a mass of 15 mg and a charge of +10 nC. Will the glass bead "leap up" to the plastic sphere?