# 01 – Coulomb's law (Ch. 21)

$k = 1/4\pi\varepsilon_0 = 8.99 \cdot 10^9 \, \text{N m}^2/\text{C}^2$

1) Of the charge Q initially on a tiny sphere, a portion q is to be transferred to a second, nearby sphere. Both spheres can be treated as particles and are fixed with a certain separation. For what value of q/Q will the electrostatic force between the two spheres be maximized?

3) What must be the distance between point charge $q_1 = 26.0 \, \mu\text{C}$ and point charge $q_2 = -47.0 \, \mu\text{C}$ for the electrostatic force between them to have a magnitude of 5.70 N?

6) Two equally charged particles are held $3.2 \cdot 10^{-3}$ m apart and then released from rest. The initial acceleration of the first particle is observed to be 7.0 m/s$^2$ and that of the second to be 9.0 m/s$^2$. If the mass of the first particle is $6.3 \cdot 10^{-7}$ kg, what are (a) the mass of the second particle and (b) the magnitude of the charge of each particle?

14) Three particles are fixed on an $x$ axis. Particle 1 of charge $q_1$ is at x = -a, and particle 2 of charge $q_2$ is at x = +a. If their net electrostatic force on particle 3 of charge +Q is to be zero, what must be the ratio $q_1 /q_2$ when particle 3 is at (a) x = +0.500a and (b) x = +1.50a?