

## Electric Force Problems

1. In Figure-1, the particles have charges  $q_1 = q_2 = 100 \text{ nC}$  and  $q_3 = q_4 = 200 \text{ nC}$ , and distance  $a = 5.0 \text{ cm}$ . What are the (a) x and (b) y components of the net electrostatic force on particle 3? (Ans : (a) 0.17 N (b)  $-0.046 \text{ N}$ )

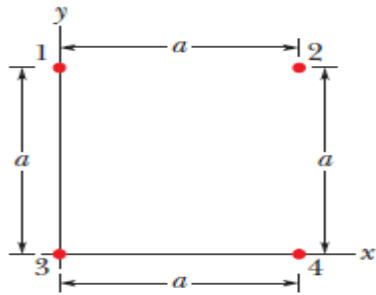


Fig-1

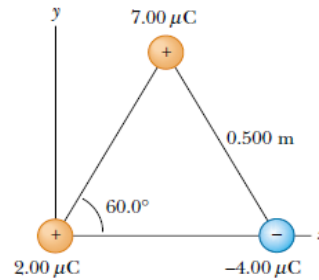


Fig-2

2. Three point charges are located at the corners of an equilateral triangle, as shown in Figure -2 . Calculate the net electric force on the  $7 \mu \text{C}$  charge.
3. A point charge  $q_1 = -9 \mu \text{C}$  is at  $x=0$  , while  $q_2 = 4 \mu \text{C}$  is at  $x=1 \text{ m}$ . At what point, besides infinity, would the net force on a positive charge  $q_3$  be zero ? ( $d=2\text{m}$ )
4. At what separation would the force between a proton and an electron be  $1 \text{ N}$  ? (Ans:  $1.52 \times 10^{-14} \text{ m}$ )
5. In Fig. 3a, particles 1 and 2 have charge  $20.0 \text{ mC}$  each and are held at separation distance  $d = 1.50 \text{ m}$ . (a) What is the magnitude of the electrostatic force on particle 1 due to particle 2? In Fig3b Particle 3 of charge  $20.0 \text{ mC}$  is positioned so as to complete an equilateral triangle. (b) What is the magnitude of the net electrostatic force on particle 1 due to particles 2 and 3? (Ans: (a) 1.6 N, (b) 2.77N)

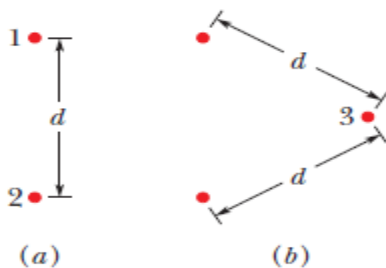


Fig-3

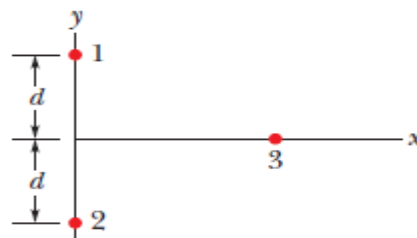


Fig-4

6. In figure-4 , particles 1 and 2 of charge  $q_1 = q_2 = +3.2 \times 10^{-19} \text{ C}$  are on a y axis at distance  $d = 17 \text{ cm}$  from the origin. Particle 3 of charge  $q_3 = +6.4 \times 10^{-19} \text{ C}$  is moved gradually along the x axis from  $x=0$  to  $x=+5 \text{ m}$ . At what values of  $x$  will the magnitude of the electrostatic force on the third particle from the other two particles be (a) minimum and (b) maximum? ( Ans: (a) 0 (b) 12cm)