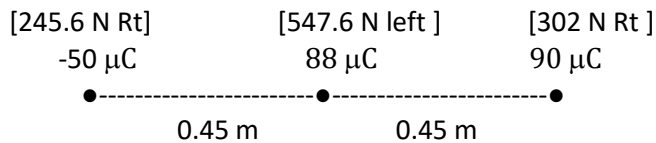


Directions: Show all your work and label all answers and show steps to solutions. If you show a formula not on the formula sheet, you must show how you got it!! Explain answers when necessary.

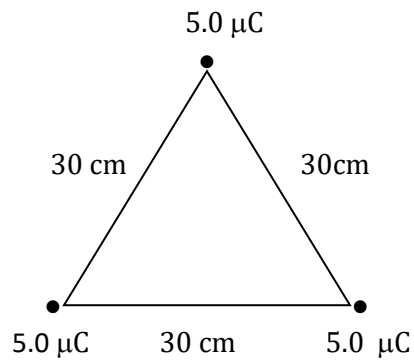
1. Two charged bodies exert a force of 0.55 N on each other. What will be the force if they are moved so they are only one fifth ( $1/5$ ) as far apart? 2 pts [13.75 N]

2. How many electrons make up a charge of  $300 \mu\text{C}$ ? 2 pts [ $1.875 \times 10^{15} e^-$ ]

3. Particles of charge  $+90$ ,  $+88$ , and  $-50 \mu\text{C}$  are placed in a line seen below. The center one is  $0.45 \text{ m}$  from each of the others. Calculate the net force on each due to the other two. 10 pts.



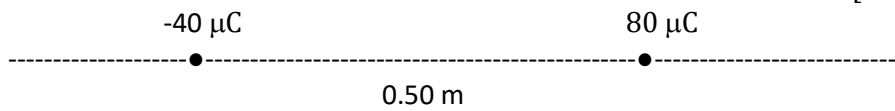
4. Three positive particles of charges  $5.0 \mu\text{C}$  are located at the corners of an equilateral triangle with  $30 \text{ cm}$  sides. Calculate the magnitude AND direction of the net force on each particle. 10 pts. [  $4.33 \text{ N @ } 30^\circ$  ]



5. What is the magnitude and direction of the electric field at a point midway between a  $-6.0 \mu\text{C}$  and a  $+18.0 \mu\text{C}$  charge  $12.0 \text{ cm}$  apart? 10 pts. [  $6.0 \times 10^7 \text{ N/C}$  ]

6. What is the acceleration of an electron in a 6500 N/C Electric field? 3 pts.  
[ $1.14 \times 10^{15} \text{ m/s}^2$ ]

7. (III) Two charges below are separated by a distance of 0.50 m. Where along the line separating them can we place a point charge such that it feels no electrical force? 10 pts.  
[ 1.21 m left of  $-40 \mu\text{C}$  ]



8. You are given two unknown point charges,  $Q_1$  and  $Q_2$ . At a point on the line joining them, one-third of the way from  $Q_1$  to  $Q_2$ , the electric field is zero. What can you say about these two charges? 10 pts. [ $Q_2 / Q_1 = 4 / 1$ ]

9. Examine the drawings below. Determine:

- a. Which has a greater E-Field? A. -10 V B. -5 V C. -2 V (1 pt) [A]

Why? \_\_\_\_\_

(Density of E field lines)

\_\_\_\_\_ 2 pts

- b. Calculate the work done to move a charge ( $q=2C$ ) from -2V to -10 V. 5 pts.

