**Coulomb’s law and Vectors.**

**When ever you are trying to calculate the “net” force on a charged particle that involves the interaction of 3 charged particles you need to solve the resultant of the two force vectors that are interacting.**

**Just like any vector additions, they can either be linear or non – linear.**

1. **Linear: If charged particle “A” has a charge of + 2.5 x 10-8 coulombs and is .005 m above particle “B” which has a charge of – 3.7 x10-8 coulombs and particle “C” with a charge of –10.5 x 10-8 coulombs .001 m below “B”, what is the not force on particle “B”?**

**.005m**

**.001m**

**1st: calculate the two forces that are acting on “B”: FAB (force between A and B) and FCB (force between C and B).**

**FAB = 9x109 (2.5 x10-8 x –3.7 x 10-8) / .0052**

**FAB = -.333 N (negative answer indicates attraction)**

**FCB = 9x 109 (-10.5 x 10-8 x –3.7 x10-8) / .0012**

**FCB = 34.965 N (positive answer indicates repulsion)**

**2nd: Draw a picture of the two calculated vectors to see if they need to be added together or subtracted (remember “tip to tale).**

**34.965 N (Fcb)**

**.33 N (Fab)**

**Net force on “B” = .333 N + 34.965 N = 35.298 N up**

\*\*Vectors are added together because they are in the same direction.

1. Non – Linear: If charged particle “A” has a charge of – 7.5 x 10-5 and is .006 m under particle “B” which has a charge of –2.0 x 10-5 and particle “C” has a charge of –15 x 10-5 is .002 m directly to the right of particle “B”, what is the net force on “B”?

1st : Calculate the force between A and B (FAB) and the force between C and B (FCB).

FAB = 9 x 109 (-7.5 x 10-5 x –2.0x10-5) / .0062 =

375,000 N (repulsion)

FCB = 9x109 (-15x10-5 x 2x10-5) / .0022 =

6,750,000 N (repulsion)

2nd : Re – draw vectors (forces) as arrows is the right direction.

3rd : Solve the magnitude of the resultant by using Pythagorean and solve the angle by using tangent.

6,750,0002 + 375,0002 = R2

R = 6760223.8 N

Tan of the angle = 6,750,000/375,000

= 86.82

R = 6,760,223.8 N @ 86.82