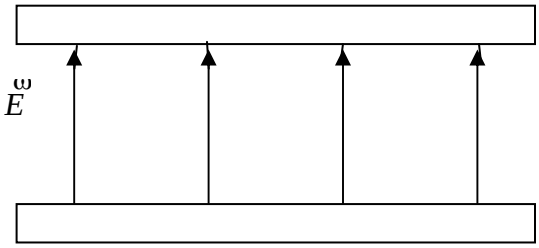
Chapter 23 Examples

1) A potential difference is applied across the plates of a capacitor with a plate separation of 1 meter, as seen below.



a) Which plate is at the higher electric potential or voltage?

b) If an electric field of 10 N/C is produced, what is the potential difference between the plates? (WE'LL ANSWER THIS IN CH 24)

c) A proton is released from rest at the bottom plate. What is its speed when it reaches the top plate?

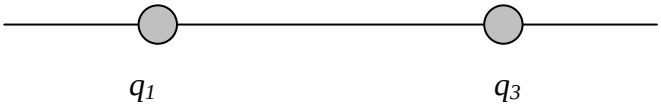
d) An electron is released from rest at the top plate. What is its speed when it reaches the bottom plate?

2) Now set-up/solve two problems that are very similar to chapter 22, examples 2 & 3, the main change to the problems if that the words "Electric Force" have been replaced with "Electric Field." [**Notice** how we can use the answers to ch 22, #2 & #3 to get the below answers quickly.]

(a) Two charges, $q_1 = +4\mu C$ and $q_3 = +3\mu C$, are 1 meter apart and lie along a line.

(i) Determine the exact position where a third charge, $q_2 = -5\mu C$, should be placed so that the Electric Field at q_2's position is zero.

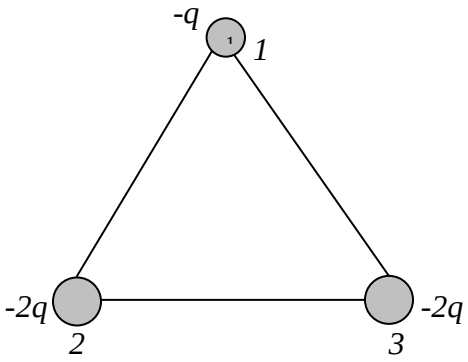
(ii) Will the Electric Field still equal zero at the position you found above [in part (i)] regardless of whether q_2 is at that position?



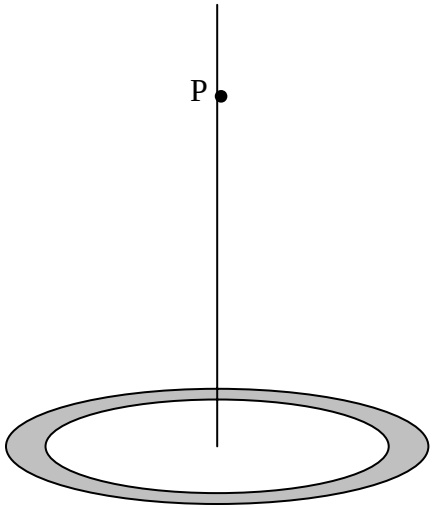
(b) Three charges are arranged in an equilateral triangle with sides of length 1 meter, as shown below.

(i) Draw a complete Vector Diagram of the Electric Fields at the position of charge 2 and determine the net Electric Field at the position of charge 2 if $q = 5n$C.

(ii) Is your answer to part (i) still the same if charge 2 is removed?

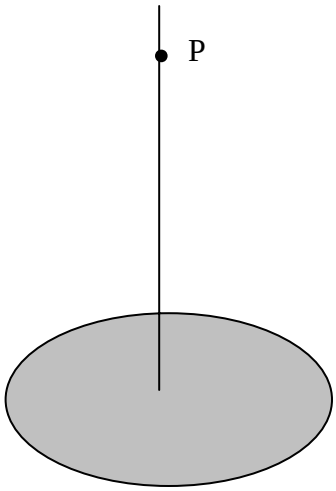


3) (a) Find the Electric Field at a point P, a distance *z* above a uniform ring of charge with radius R and total charge +q.



#3) (continued)

(b) Find the Electric Field at a point P on the central axis of a thin, uniformly charged non-conducting disk, a distance z above the center of the disk, if the total charge on the disk is $-q$ and the radius of the disk is R.



4) Find the Electric Field at a point *P* on the perpendicular bisector of a thin charged rod, a distance *y* from the center of the charged rod. Assume the rod has non-uniform charge density $\lambda = +2|x|\ \ Coulombs/meter^2$ and the rod has a total length *L*.