In Class Notes Wednesday 9/12/07
Chapter 15

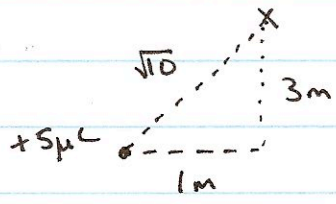
* Introduction to Chapter 15
  * Mostly a math formulation for the electric field due to a distribution of charges on different types of objects
  * Calculus review on integration may be needed.

* Ponderables - Charges on a Rod
  → You can think of approximating the electric field due to a charged rod by taking the total charge and replacing it with point charges equidistant along the rod. By calculating the electric field due to each of these pieces, and using the principle of superposition, you can approximate the electric field some distance away from the ⊥ bisector of the rod.

Objectives: Calculate the electric field due to various charge distributions

Tangible - Charged up Table Occupants

Use principle of Superposition and symmetry to your advantage



$$E_{max\ (due\ to\ 1)} = \frac{1}{4\pi\varepsilon_0}\frac{5\times10^{-6}\,C}{(\sqrt{10}\ m)^2} = 4500\ N/C$$

$$\vec{E}_{due\ to\ 1} = \langle 4500 * \tfrac{1}{\sqrt{10}},\ 4500\tfrac{3}{\sqrt{10}},\ 0\rangle\ N/C$$

$$\vec{E}_{net} = \#\ of\ charges * \langle 0,\ 4269,\ 0\rangle\ N/C$$

→ Total Field = total # of charge times vertical component of field

Objectives: sketch and calculate the E field due to various charge distributions. Find E field vector due to a pt. charge Superposition principle.

Tangible - Calculate the field due to a ring of charge

The magnitude of the electric field has an interesting behavior along the axis of a ring. The E field has a value of 0 at ∞ and at the center of the ring

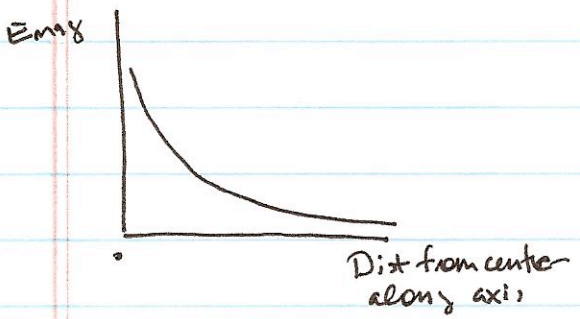
→ width of peak depends on the radius of the disk
* ↓ radius, thinner the peak

→ as $r \to 0$, the plot resembles a $1/r^2$ behavior (that of a pt charge)

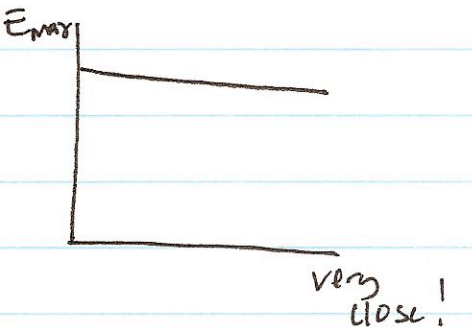
Objectives: Sketch ; calc E field due to a ring.

Tangible – Calc the field due to a ~~ring~~ disk of charge
Summing the contributions to individual rings until we get some solid disk.

Plot of E_{mag} vs dist



Close to the disk on the axis



↳ a big sheet of uniform charge, produces a uniform electric field

Objectives: Sketch & calculate the electric field due to a ring.

End of note.