

Go to: Course homepage, Lectures

Lecture 12 iq10

Demo: Hair on end, Discharging a capacitor

Discussions on h3 problems.

1. Uniformly charged sphere (001, 006, 007). Extra clicker: **h3-001**.
2. Field due to charged plates. Extra clicker: **h3-004**
3. Comments: h3-005, 008, 009.
4. h3: 012-014. What are q' and q'' ? **Clicker 11-2**.
5. h3: 018. **Clicker 12-1**.

Class Announcements:

- Course summary of unit 1 has been updated. Please call my attention for errors. This summary page will be distributed during the exam. No "cheat sheet" is allowed during the exam.
- Mark your calendar:
 1. There will be a review session for midterm1: Wed 5-6pm, location TBA.
 2. There will be an extended office hour: Thursday 1:30-3:30 pm, for Q and A.

Application for "Summer-CA for Chiu"

- We are looking for an undergrad computer assistant who can convert present handwritten classnotes (posted under the link Lectures in our homepage: <http://www.ph.utexas.edu/~itiq/303Lsp13/chiu/>) into quality editable efiles.
 - The text will be typed in Latex format.
 - The figures will be redrawn using an appropriate free download illustrator application so that each figure is editable.
- The applicant need to submit following documents together with his/her CV application to Lisa Gentry, ugaffairs@physics.utexas.edu The deadline for the application is on Friday, Feb. 15.
 1. Please submit sample editable files to demonstrate the applicant has the computer skill to do the job.
 2. The applicant also needs to submit his/her detailed estimate on the total time needed to complete the project. There are approximately 40 lectures in total. When you estimate the total time needed, be as accurate as you can. Keep in mind we are looking for a quality work which can be completed within a reasonable amount of time.

Applications submitted will be reviewed by our selection committee. If you have any

Discussion on h3 problems

1. Uniformly charged sphere (001, 006, 007)

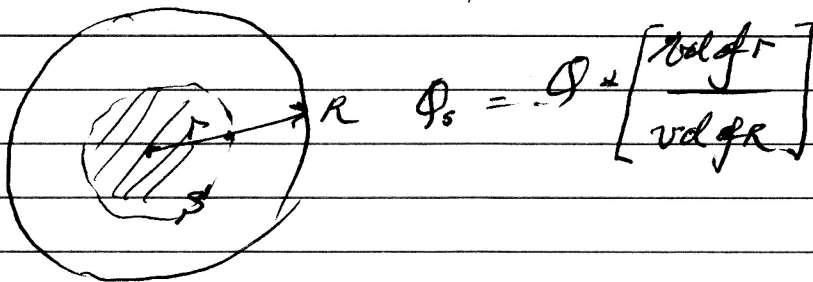
Given: ρ, R

Find: ϕ thru Gauss's law

What is E at r ? What E vs r .

$$G-L: \phi_s = \frac{Q_s}{\epsilon_0}$$

Once Q_s is found, $\Rightarrow \phi, E$.



→ Ig: choices 5 integrals

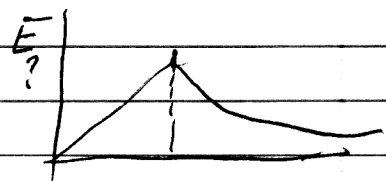
either h3: 1, 6, 7.

	Q_s
1)	$Q \left(\frac{r}{R} \right)$
2)	$Q \left(\frac{r}{R} \right)^2$
3)	$Q \left(\frac{r}{R} \right)^3$

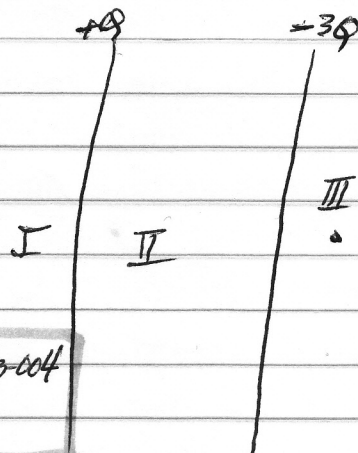
G-L

$$\text{Then: } E \cdot 4\pi r^2 = \frac{Q \left(\frac{r}{R} \right)^3}{\epsilon_0}$$

$$E = \frac{Q \left(\frac{r}{R} \right)^3}{4\pi r^2 \epsilon_0}$$



003-004
Find due to 2 charged plates (lgs)



Method of superposition -

Check: 103-004
extra

left plate: $|E_{\text{left}}| = \frac{Q/A}{2\epsilon_0}$

right plate: $|E_{\text{right}}| = \frac{3Q/A}{2\epsilon_0}$

	I	II	III
left plate	←	→	→
right plate	→	→	←

Given: $+Q, -3Q$

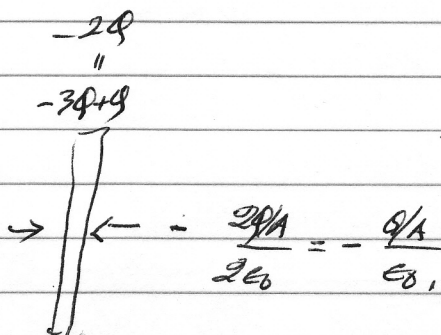
Find: E_{III}

III: $E_{\text{III}} = E_{\text{left}}^{\text{left}} + E_{\text{right}}^{\text{right}}$

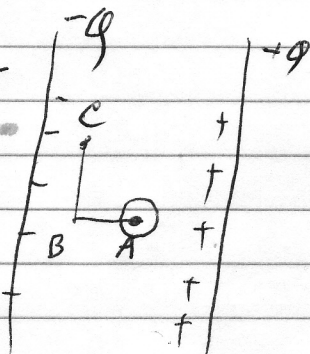
$$= \frac{Q/A}{2\epsilon_0} - \frac{3Q/A}{2\epsilon_0}$$

$$= -\frac{Q/A}{\epsilon_0}$$

Intuitive reasoning:



Comments 005



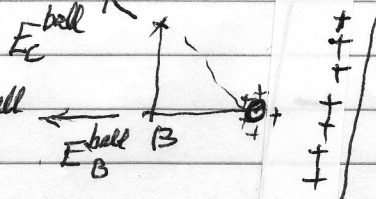
Rank order

$|E_A|, |E_B|, |E_C|$

Hint: $E_A \geq E_B \geq E_C$

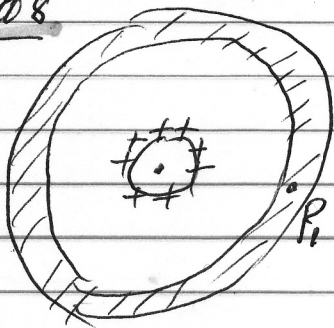
Compare:

$E_A^{\text{ball}}, E_B^{\text{ball}}, E_C^{\text{ball}}$



12-3

108



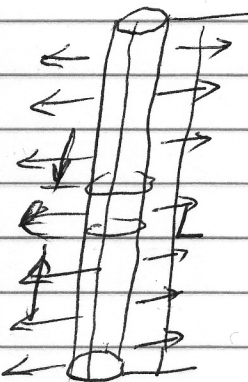
Hint: What is $E_{pl, m}$?

R_2

When compute $E_{pl, m} + E_{pl, p}$

Use Gauss Law.

109



Cylindrical symmetry implies:

$$\frac{\Phi_L}{\Phi_R} = \frac{E_{20} L}{E_{20} R L} = \frac{L}{R}$$

112-04 ^{Reminds} Gauss E_1 at 0, E_2 in the shell

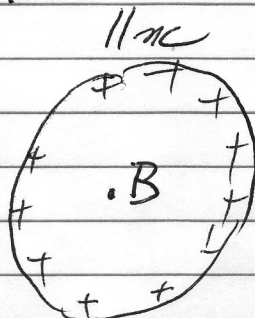
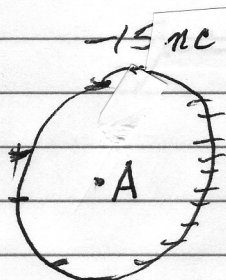
Find: E_1 and E_2

111-2

018

Clicked: 12-1

Find: E_A^{metal}



Hint

$$E_A^{\text{all}} = E_A^{\text{metal}} + E_A^{\text{plastic}} = 0$$

$$E_A^{\text{metal}} = -E_A^{\text{plastic}}$$

Metal

plastic

112-1