

PHYS 1512 Discussion Section: Week 1

Connor Feltman

University of Iowa

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My Introduction

- My name is Connor Feltman
- Email: cfeltman@uiowa.edu
- Office is VAN 409
- Office hours are Tuesdays 2-3pm
- Tutorial Center is in VAN 310 for homework questions
- Structure of these sessions:
 - 1) Get into groups of no more than 2-3 people
 - 2) I will present a problem for you to work out with your group
 - 3) The TA's will walk around to see how you are doing
 - 4) After some time I will present another problem
 - 5) Last few minutes of class will be left for individual questions

The purpose of discussion

This is a time for practice. For you to make mistakes and know that it's perfectly fine to do so. This time is yours to ask conceptual questions or clear up confusion.

ASK QUESTIONS. PLEASE!

Things to bring to discussion

- Something to write on
- Something to write with
- The Textbook

Your Introduction

Take some time to familiarize yourself with the people around you:

- Introduce yourself
- Give your major/field of interest
- If you were a meme, which meme would you be?

Relevant Equations

$$\vec{F} = k \frac{|q_1 q_2|}{r^2} \quad (1)$$

$$\vec{E} = \frac{\vec{F}}{q_o} \quad (2)$$

$$\vec{E} = k \frac{|q|}{r^2} \quad (3)$$

$$\vec{E} = \frac{\sigma}{\epsilon_o} \quad (4)$$

$$\Phi_E = \Sigma(E \cos \phi) \Delta A = \frac{Q_{enc}}{\epsilon_o} \quad (5)$$

Question #1

Unit Analysis

A plate carries a charge of $-3.0 \mu\text{C}$, while a rod carries a charge of $+2.0 \mu\text{C}$.

- How many electrons must be transferred from the plate to the rod, so that both objects have the same charge?
- How much mass was added to the rod?

$$q_e = -1.60217662 * 10^{-19} \text{C}$$

$$m_e = 9.11 * 10^{-31} \text{kg}$$

Question #2

Electric Field Lines

A Proton and an electron are moving due east in a constant electric field that also points due east. Determine the direction of the acceleration for the two particles.

Question #3

Electric Flux through different Gaussian Surfaces

A surface completely surrounds a $+2 * 10^{-6}\text{C}$ charge. Find the electric flux through this surface when the surface is:

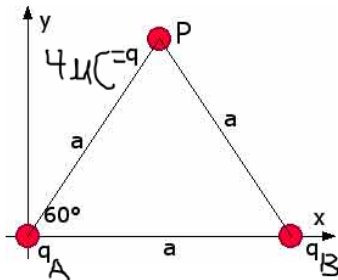
- a) A sphere of radius of radius 0.5m using $\Phi_E = \sum(E \cos \phi) \Delta A$
- b) A cube with side lengths of 0.25m using $\Phi_E = \frac{Q_{enc}}{\epsilon_o}$
- c) How do your answers compare? Why are they this way?

Question #4

Triangle Configuration

The drawing below shows an equilateral triangle with point charges on the vertices. The charge at the peak has $q_p = +4.00\mu\text{C}$ while q_A and q_B are unknown. If the net force acting on q_p is vertically downward:

- What are the signs of charges q_A and q_B ?
- How do they compare?
- Draw the force diagram for charge q_p . Include: F_{Ap} , F_{Bp} and F_{net}



Question #5: Challenge Problem

Cumulative Physics

An Electron is released from rest at the negative plate of a parallel plate capacitor. The charge per unit area on each plate is $\sigma = 1.8 * 10^{-7} \text{ C/m}^2$ and the plate separation is $1.5 * 10^{-2} \text{ m}$. How fast is the electron moving just before it reaches the positive plate?