PHYS 1512 Discussion Section: Week 1

Connor Feltman

University of Iowa

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My Introduction

- My name is Connor Feltman (Daniel Simons, Lucas Beving)
- Email: cfeltman@uiowa.edu (daniel-simons@uiowa.edu, lucas-beving@uiowa.edu)
- Office is VAN 403 (VAN 409, VAN 215)
- Office hours are Tuesdays 2-3pm
- Tutorial Center is in VAN 310 as another resource for you
- Structure of Discussion:

  1) I will provide a quick review lecture ($<$5min)
  1) The equations for the day will be displayed
  2) I'll address any questions you have
  3) Then I'll present 4-5 problems to work out
  4) TA's will walk around to answer questions during 3)
  5) After some appropriate time, the solution will be presented and discussed

The purpose of discussion

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

ASK QUESTIONS. DISCUSS WITH OTHERS. PLEASE!

Things to bring to discussion

Must have:

- Something to write on
- Something to write with
- Calculator

Recommended:

- The textbook for reference
- An equation sheet

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?

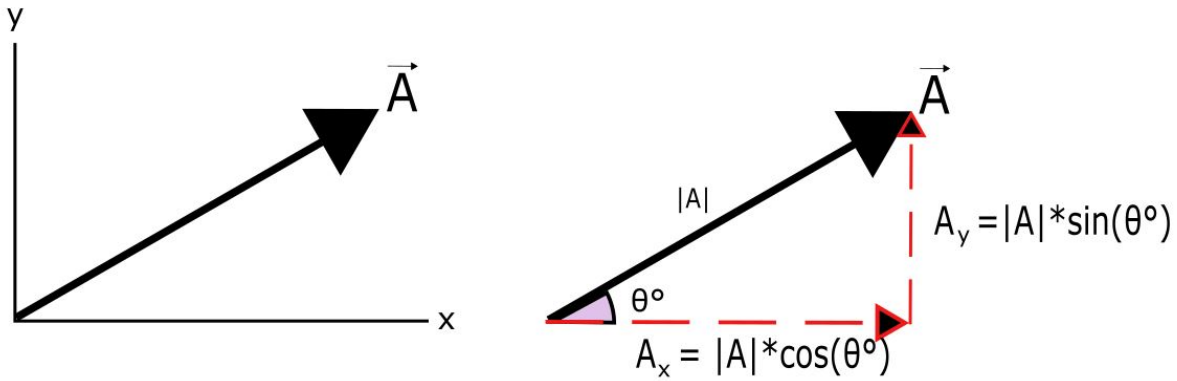
Review Lecture

Chapter 1

-Units/dimensional analysis

-Scalars vs Vectors

-Trig using vectors $\vec{A}$



-Vector addition and subtraction (Tail to Head method)

Relevant Equations

$$|A| = \sqrt{(A_x)^2 + (A_y)^2} \qquad \text{(For a 2D Vector } \vec{A}\text{)} \tag{1}$$

$$cos(\theta) = \frac{\text{Adjacent}}{Hypotenuse} \tag{2}$$

$$sin(\theta) = \frac{Opposite}{Hypotenuse} \tag{3}$$

$$tan(\theta) = \frac{sin(\theta)}{cos(\theta)} = \frac{Opposite}{Adjacent} \tag{4}$$

Reminder Math

$$\pi \text{ radians} = 180^\circ \qquad \text{(radians to degrees)} \tag{5}$$

$$\frac{4 * (\frac{3}{4})}{(\frac{2}{5})} = \frac{3}{(\frac{2}{5})} = 3 * \frac{1}{(\frac{2}{5})} = 3 * \frac{5}{2} \qquad \text{(fractions of fractions)} \tag{6}$$

Question #1

What dimension is it?

An equation you may encounter in the future can be messy, but looking at its units can tell you what the dimensions ought to be. Consider the equation:

$$\frac{\Delta x^3 * \rho * v}{a * (mass)^2} \Longrightarrow \frac{(m^3) * (\frac{kg}{m^3}) * (\frac{m}{s})}{(\frac{m}{s^2}) * kg^2}$$

What are the units for the equation after cancellation?

(Note: m - meters, s - seconds, kg - kilograms)

Question #2

Speed Round!

1) When you read the speedometer of your car, is the number you read a vector or a scalar?

2) If vector A points West, Vector B points East and vector C points South-East, which of the following could their vector sum NOT point towards. Notice I haven't told you their magnitudes:

a) South-West
b) South
c) North-West
d) Almost completely West

3) True or False: $|\vec{A} + \vec{B}|$ is sometimes greater than $|\vec{A}| + |\vec{B}|$

Trig! Huzzah! #3

"Practical Example"

You are late to class! You're running down the Van Allen hallway to the classroom and you want to know the shortest distance to the door. You're facing east and the door appears to be 85 ft further east and 10 ft south. What is the shortest path you could take to reach the door? At what angle (from east) should you turn to run along this path? (express your angle in degrees and radians)

Bonus: If the door closes in 10 seconds and you run at a constant speed of 9 ft/s, do you reach the classroom in time if you walk first 45ft east then 10ft south? What about along the shortest path?

Question #4

Check your vector Victor

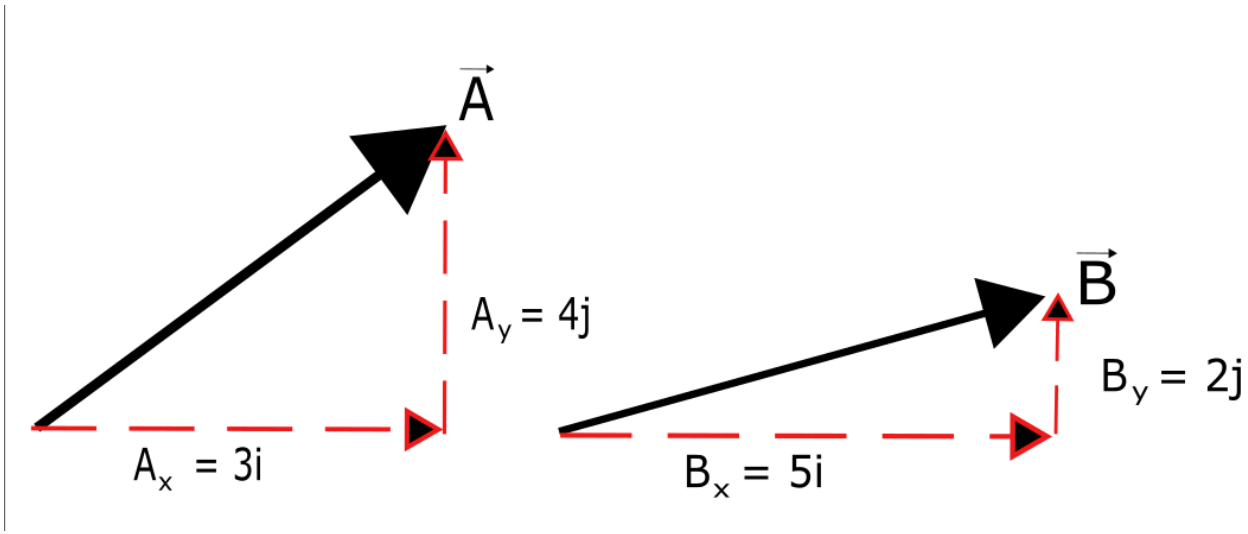
Two vectors are displayed in the picture below. Find:

a) The $\hat{x} + \hat{y}$ coordinates of $\vec{A} + \vec{B}$. Draw: $\vec{A} + \vec{B}$, $\vec{A}$, $\vec{B}$

b) The $\hat{x} + \hat{y}$ coordinates of $\vec{A} - \vec{B}$. Draw: $\vec{A} - \vec{B}$, $\vec{A}$, $\vec{B}$

c) Find the angle (from + x) in radians for the resultant vector of part a

d) Calculate $|\vec{A} - \vec{B}|$



Question #5: Challenge Problem

Equation of line perhaps?

Two geological field teams are working in a remote area. A global positioning system (GPS) tracker at their base camp shows the location of the first team as 38 km away, 19° north of west, and the second team as 29 km away, 35° east of north. When the first team uses its GPS to check the position of the second team, what does the GPS give for the second team's:
a) Distance from them
b) Direction, measure from due east?