Physics

Fall 2025

Weeks 1 - 2

Wednesday / Thursday (Aug 13 – 14)

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Science Department Chair

About me:

- 5th year at MacArthur, 19th year teaching
- BA in Chemical Physics, minors in math and computer science
- Masters of Education in Curriculum, Instruction, and Assessment
- Doctorate of Education in K-12 Leadership
- Army Veteran, 6 years as an MP with the 101st Airborne

Friday (August 15)

- T: safety
- O: I will be able to understand safety and lab policies
- D: by reading the Flinn Safety contract and discussing safety protocol
- A: safety
- Y: Whose responsibility is safety?

Open the Safety Contract found on the class website.

- In your groups, we will divide the safety contract up as follows:
  - Person 1: read rules 1 – 13 to themselves.
  - Person 2: read rules 14 – 28 to themselves.
  - Person 3: read rules 29 – 42 to themselves.
  - Person 4: read rules 43 – 55 to themselves.
- You will have 7 minutes to read your rules silently to yourselves.

Monday / Tuesday (August 25 – 26)

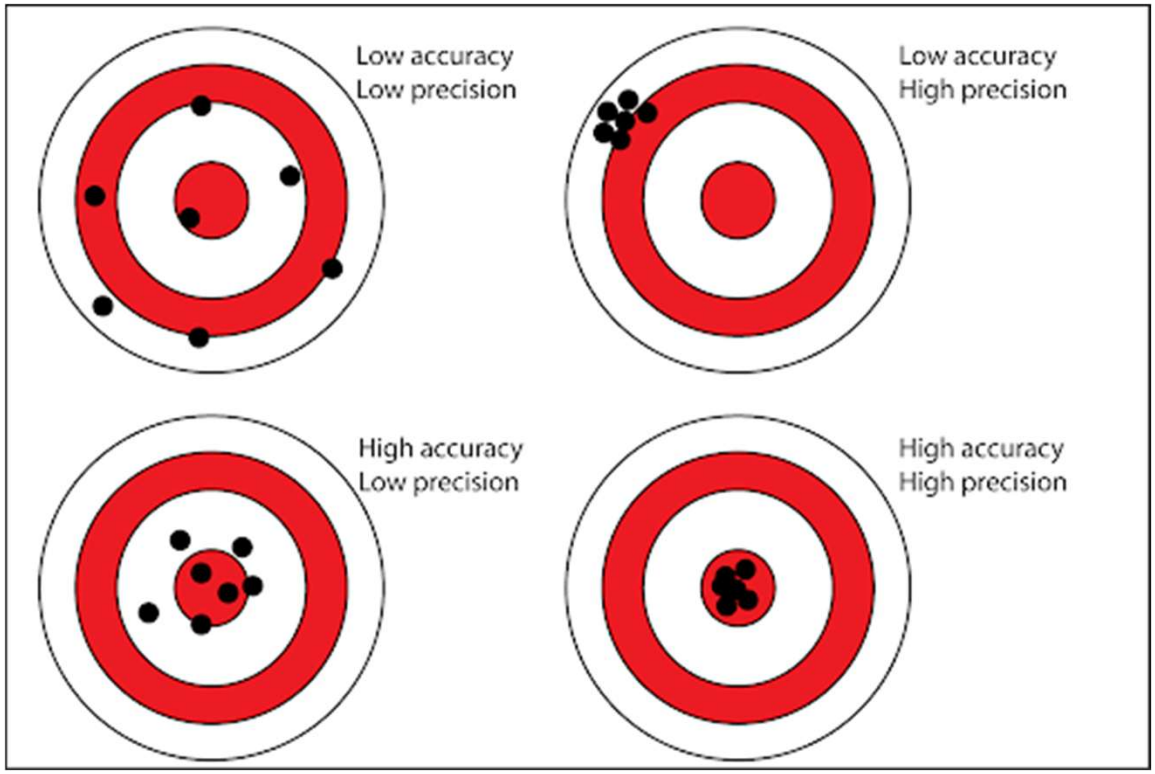
- T: 2C - use mathematical calculations to assess quantitative relationships in data
- O: I will be able to explain the importance of accuracy, precision, and details in a scientific manner
- D: by measuring the classroom with different instruments and discussing the pros and cons of each
- A: meter, volume, scientific notation, accuracy, precision, frame of reference
- Y: What is the importance of accurate and precise measurement?

Simple Definitions

- Precision: How good you are

- Accuracy: How good your equipment is

Target Practice



Frame of Reference

Frame of Reference

- “an abstract coordinate system whose origin, orientation, and scale are specified by a set of reference points”

Speed of Light

- 3.0×10^8 m/s

- Star gazing = looking in the past

Vocabulary

- Distance = how much ground is covered
- Displacement = how far is it from the beginning
- Scalar = having only magnitude
- Vector = having magnitude and direction

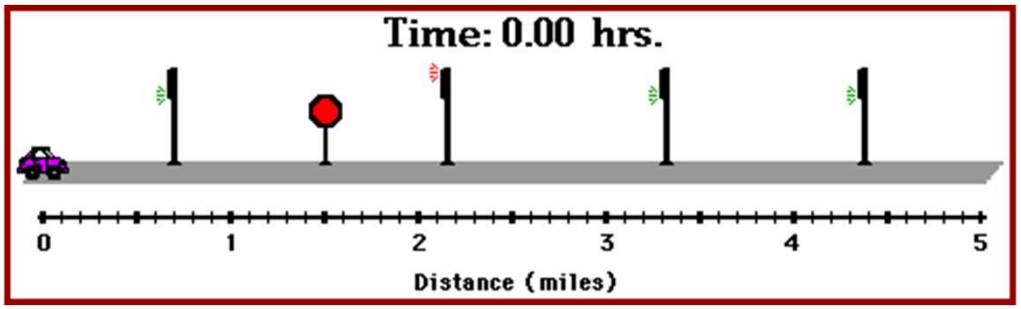
Calculating Distance and Displacement

- To find total distance, just add the scalar component of each leg of the journey
- To find the displacement, draw a straight line from the starting point to the finish (you may have to use the good ol' Pythagorean theorem)

Wednesday / Thursday (August 27 – 28)

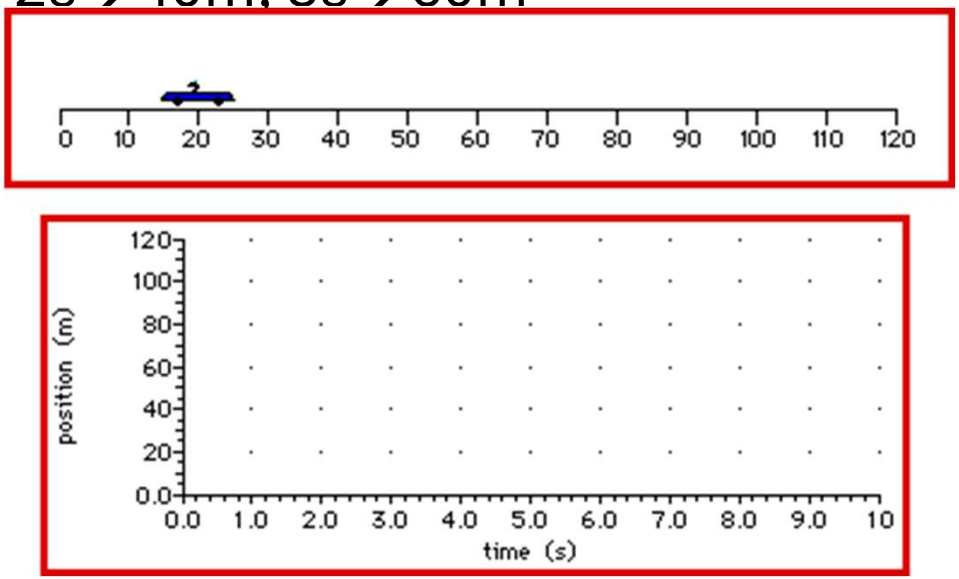
- T: : 2C - use mathematical calculations to assess quantitative relationships in data
- O: I will be able to solve for and explain speed and velocity
- D: by taking notes, solving problems, and discussing my results with my group.
- A: velocity, speed
- Y: What is the difference between velocity and speed.

Speed is the distance traveled by a moving object over a period of time



Constant speed

- A moving object that doesn't change it's speed
- Constant speed means equal distances are covered in an equal amount of time
- Ex. 1s→ 20m, 2s→40m, 3s→60m



Calculating Speed

- Speed = $\frac{\text{Distance}}{\text{Time}}$
- If a runner travels 100 m in 10 seconds what was his average speed?
- Probably not constant
- Can solve for the other pieces too
- Distance = speed x time
- Time = $\frac{\text{Distance}}{\text{Speed}}$

Velocity is speed in a given direction

$$\text{Average Velocity} = \frac{\Delta\,\text{position}}{\text{time}} = \frac{\text{displacement}}{\text{time}}$$

$$\text{average velocity} = \frac{\text{displacement}}{\text{time interval}}$$

$$\bar{v} = \frac{\Delta d}{\Delta t}$$

- **<u>instantaneous velocity</u> - the velocity that something has at any one instance**

  - *(The terms instantaneous speed and avg. speed may also be used)*

Friday (August 29)

- Safety Quiz

- T: Safety
- O: I will be able to demonstrate my understanding of safety
- D: by passing the safety quiz.
- A: safety
- Y: Why is safety in the lab important?