

# Physics Exam Review

Friday, June 15, 2018 9:01 AM

## Physics In Motion

- Scalar vs. Vector
    - Know the difference between these two terms
      - Scalar: only a measurement
        - Time, distance, speed
      - Vector: measurement with direction
        - Displacement, velocity, acceleration
  - Formulas
    - Be able to use formulas on formula sheet to correctly calculate displacement, speed, velocity, acceleration, force, distance, time, etc.
    - See your formula sheet
    - Check in with Ms. Kalyta if you have any questions
  - Position-Time graphs
    - Know what is needed to have a complete graph (title, labels, etc)
    - Be able to create/tell a story from a line on the graph
      - Make sure to take your units into consideration
    - Know what the different types of lines will mean (horizontal, different slopes, straight lines, curved lines, etc)
      - Straight horizontal line = no movements
      - Straight sloped line = constant speed/velocity
        - Going away from the origin line = positive velocity
        - Going towards origin line = negative velocity\
        - \*\*\*origin is the zero line
      - Curved line = acceleration (change in velocity)
        - Line is getting steeper = speeding up
        - Line is getting more horizontal = slowing down
        - Going away from origin = positive direction
        - Going towards origin = negative direction
    - Be able to find the slope of a line to calculate the speed/velocity
- Handwritten note: delta = "change in"*
- $$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$
- Be able to create a graph from data points, and interpret it
    - Refer to examples in notes
  - Know the difference between uniform motion and non-uniform motion, and what both would look like on a graph
    - Uniform motion = constant motion, unchanging motion
      - Straight lines
    - Non-uniform = changing motion
      - Curved lines
- Newton's Laws
  - Be able to identify all 3 laws
  - Be able to use all 3 laws to describe motion
    - Given an example, need to explain the outcome with the

laws

- Be able to create real life examples of each law
  - Law 1: Law of Inertia
    - "an object in motion stays in motion, an object at rest stays at rest, unless acted upon by an outside and unequal force"
    - Car crashes....your body keeps moving after the car has stopped because a force needs to cause your body to stop.
  - Law 2:  $F=ma$ 
    - "the force, mass, and acceleration of an object follow a relationship according to  $F=ma$ "
      - If force stays the same:
        - ◆ Mass increase = acceleration decrease
        - ◆ Acceleration increase = mass decrease
      - If mass stays the same:
        - ◆ Force increase = acceleration increase
        - ◆ Acceleration decrease = force decrease
      - If acceleration stays the same:
        - ◆ Force increase = mass increase
        - ◆ Mass decrease = force decrease
  - Law 3: action/reaction
    - "Every action has an equal but opposite reaction"
    - Recoil on a gun
      - Gun pushes the bullet forward, bullet pushes the gun backwards with same force.
      - Skateboarding jump: you push downward on the board, the board pushes upward on your feet.

mass & acceleration are inversely proportional

directly proportional

• Momentum

- Know what goes into calculating momentum
  - $P=mv$ 
    - momentum
    - mass (kg)
    - velocity (m/s)
    - "quantity of motion"
- Know how to correctly determine the different momentum between two different objects
  - Think the train versus the toy car example

• Impulse

- Know how to calculate:
  - $I = Ft$ 
    - impulse
    - Force (N)
    - time (s)
- Know how it's related to momentum
  - Opposing momentum
- Know why in car crashes the goal is to increase the time of impact
  - A larger time will mean a lesser force on the individual

## impact

- A larger time will mean a lesser force on the individual

$$\boxed{I} = F \cdot t$$

stays constant ↓ ↑

if impulse stays constant, if we increase our time to feel the impulse, it will mean a lesser force that we feel.