Topic 1: 2D Motion

PHYSICS 231

Current Assignments

- Homework Set 1 due this Thursday, Jan 20, 11 pm
- Homework Set 2 due Thursday, Jan 27, 11pm
- Reading: Chapter 4,5 for next week

Key Concepts: 2D motion

- Vector. Displacement, Velocity, and Acceleration are vectors.
- Representations: Graphical, angle and magnitude, components.
- Add, subtract vectors. Decompose in components, and add components to obtain total vector.
- Treat 2D motion as 2 separate problems, one for x-direction and one for y-direction.
  (decompose all vectors in x- and y- components)

Vector Concept

- A vector is a quantity that has a direction and a magnitude
- Examples so far: displacement, velocity, and acceleration
- In 1D the direction was given by the sign and a coordinate axis direction.
- In 2D its more complicated. Different representations can be used

Representation: Graphical

- Graphically as arrow:
  - Direction is direction of arrow
  - Magnitude is length of arrow (need to define some scale)
- Note: where one draws the arrow is irrelevant.
- Addition by adding arrows (form a chain)
- Subtraction by adding a inverted arrow

2D Motion Concepts

- Treat as two separate 1D problems with time as the common parameter
- In X-direction (calculate with x-components):

$$v_x(t) = v_{0x} + a_x t \qquad x(t) = x_0 + v_{0x} t + \frac{1}{2} a_x t^2$$

- In Y-direction (calculate with y-components):

$$v_y(t) = v_{0y} + a_y t \qquad y(t) = y_0 + v_{0y} t + \frac{1}{2} a_y t^2$$