

Summary of Physics for Q1:

Introductory Information:

1. **Conversion factors:**

$1 \text{ m} = \underline{100} \text{ cm}$ $1 \text{ km} = \underline{1000} \text{ m}$ $1 \text{ in} = \underline{2.54} \text{ cm}$
 $1 \text{ mile} = \underline{1609} \text{ m}$ $1 \text{ kg} = \underline{1000} \text{ g}$ $1 \text{ kg} = \underline{2.2} \text{ lbs}$

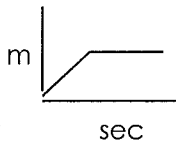
2. **Graphing relationships:**

Direct: As 1 variable goes up, the other goes up
 Indirect or inverse: As 1 variable goes up, the other goes down

1-D Motion:

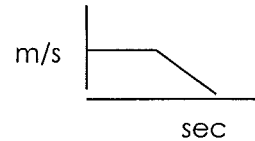
- $V = \Delta x / \Delta t$ can only be used when the velocity is constant
- When something is dropped near earth's surface, $v_i = \underline{0}$ and $a = \underline{-9.8 \text{ m/s}^2}$
- The gravity near the earth's surface is -9.8 m/s^2 . This means that for every second an object falls, its speed increases by 9.8 m/s every sec downward
 If $\Delta t = 0$, $v = \underline{0}$ If $\Delta t = 1 \text{ sec}$, $v = \underline{-9.8}$ If $\Delta t = 2 \text{ sec}$, $v = \underline{-19.6}$
- Δx and Δy are interchangeable.
- Graphs:

Distance vs. Time



Slope = m/s
 Slope measures: speed
 Horizontal line means: not moving

Velocity vs. Time



Slope = m/s^2
 Slope measures: ~~speed~~ acceleration
 Horizontal line means: constant speed
 Area under graph = $\frac{\text{m}}{2} \cdot \text{s} = \text{m}$ (distance)

Vectors:

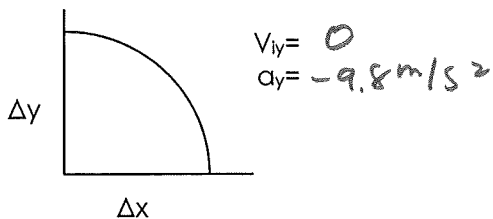
- Scalar**- quantity with just magnitude. Ex: mass, time
- Vector**- quantity with magnitude **AND** direction. Ex: ve
- Resultant - The sum of 2 or more vectors
- Adding Vectors- 2 Methods
 - Graphically:** Draw head to tail path, measure R and angle using protractor.
 - Resolution into components:** Break each vector into a right triangle and solve for x and y components. Find $R_x = A_x \pm B_x$, $R_y = A_y \pm B_y$, then use $R^2 = R_x^2 + R_y^2$ to find R.

Always put answer like this: $R = \underline{100 \text{ m}}$ at 25° N of E (or whatever direction)

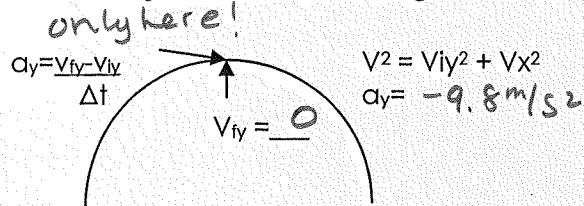
Projectile Motion:

1. A projectile is anything that once it's in the air cannot control its own motion.

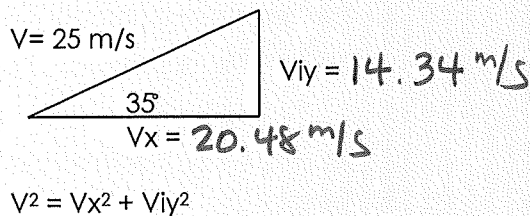
Projectiles Shot Horizontally:



Projectiles shot at an angle



At the very start, the actual velocity is made up of an x and y component. You can use a triangle to find each component. (Velocity is a VECTOR! Mag and direction!)



CANNOT interchange variables because no acceleration in x-direction

→x: $V_x = \Delta x / \Delta t$ (Can use constant V equation because: neglect air resistance

→y: $\Delta y = V_{iy} \Delta t + 1/2 a_y \Delta t^2$ and $a_y = \frac{V_{iy} - V_{iy}}{\Delta t}$

no gravity

The velocity in the **x-direction** remains constant

The velocity in the **y-direction** decreases going up and increases going down.

