Chapter 3-2: **Projectile Motion**

Text:
Chapter 3
Think and Explain: 1, 2, 6-10
Think and Solve: 1a, 2-6

Vocabulary:
component of velocity, vertical component of velocity, range, satellite

Equations:

$$x = v_x t$$

$$y = v_{yi} t + 1/2\, g t^2$$ *Note: These equations are really just* $d = vt$ *and* $d = v_i t + 1/2\, a t^2$ *!*

$$v_y = g t + v_{y_i}$$

Constants: $g = \pm 10\ m/s^2$

Key Objectives:
Concepts
- ❑ Identify the initial horizontal and vertical components of velocity for a projectile launched horizontally.
- ❑ State which velocity component changes over time and which component of velocity remains the same.
- ❑ Identify the velocity and acceleration at the highest point for a projectile launched at an angle on a level surface.
- ❑ Recognize and be able to sketch the motion graphs for a projectile. (x vs. t, y vs. t, v_x vs. t, v_y vs.t)
- ❑ State the launch angle that will yield maximum range.
- ❑ State the relationship between launch angles that will yield the same range.
- ❑ Given the paths of three projectiles, be able to describe the motion qualitatively and determine which projectile has the greatest time in air, horizontal velocity, initial vertical velocity, etc.
- ❑ Relate the motion of a satellite to the motion of a projectile.

Problem Solving
- ❑ Set up table and fill in given information for a horizontal projectile problem and solve for missing values.
- ❑ Set up table and fill in given information for a projectile launched at an angle problem and solve for missing values.
- ❑ For both type of projectile word problems (shot horizontally from an initial height, or shot from the ground) given the appropriate information you should be able to:
    - o find the time to the maximum height and/or the total time in the air.
    - o find the velocity components and speed initially, at its maximum height and when it lands.
    - o find the initial height and the maximum height of a projectile.
    - o find how far horizontally a projectile travels.
    - o calculate the speed of a projectile from the components of its velocity.
    - o calculate the components of a projectiles velocity from its speed and direction.