I.   Grade Level/Unit Number: Physics Unit 1

II: Unit Title: One-Dimensional Motion

III.   Unit Length: 10 days (block schedule) or 18 days
**   (traditional schedule)**

IV.   Major Learning Outcomes:
This unit is focused on the concept of one dimensional motion.   Students will learn about the relationships among the concepts of position, velocity and acceleration. Students will examine the graphs of position, velocity, and acceleration and relate them to the motion of a mass and to each other. Specifically students will be able to:

Velocity
- Identify a frame of reference for measurement of position and identify the initial position of the object.
- Develop the definition of velocity as the rate of change of position conceptually, mathematically and graphically (see 2.04).
- Apply the equation developed to several applications where objects are moving with constant velocity:

$$\overline{v} = \frac{\Delta x}{\Delta t}$$

- $x_f = x_i + vt$

Velocity as a Vector
- Define *vector* and *scalar*, incorporating magnitude and direction.
- Apply concepts of speed and velocity to solve conceptual and quantitative problems.
- Distinguish between distance and displacement conceptually and mathematically.
- Clarify that a positive value for velocity indicates motion in one direction while a negative value indicates motion in the opposite direction.

Acceleration
- Develop the definition for constant (uniform) acceleration as the rate of change of velocity conceptually, mathematically, and graphically (see 2.04).
- Analyze visual representations of constant and changing velocity. (see 2.04)
- Use kinematics equations for acceleration:

$$x_f = x_i + v_i t + \frac{1}{2} a t^2$$

$$a = \frac{\Delta v}{\Delta t}$$

$$v_f^2 = v_i^2 + 2a\Delta x$$

- Apply concepts of constant (uniform) acceleration to objects in free fall.

Application of Graphical and Mathematical Tools

Constant velocity:
- Measure position versus time of an object moving with constant velocity.