Planned Course: Honors Physics Unit # 1: Kinematics Estimated Time: 6 weeks	Course Number: 403H Grade Level: 11/12 Level/Track: Honors/AP	Department: Science Board Approval Date: August 27, 2018	
Big Ideas / PA Academic Standards	➢ **Core Concepts (in question format)** ● **Skills/Knowledge**	Activities/Strategies/Study Skills (identify some activities as remedial or enrichment activities)	Assessments (include types and topics)
Big Ideas **Big Idea 1:** Objects and systems have properties such as mass and charge. Systems may have internal structure. **PA Academic Standards** **3.2.P.B1:** Differentiate among translational motion, simple harmonic motion, and rotational motion in terms of position, velocity, and acceleration.	➢ What is physics? ● Identify activities and fields that involve the major areas within physics. ● Describe the process of the scientific method. ● Describe the role of models and diagrams in physics. ➢ How are measurements made in physics? ● List basic SI units and the quantities they describe. ● Convert measurements into scientific notation. ● Distinguish between accuracy and precision. ● Use significant figures in measurements and calculations. ➢ How is math used as the language of physics? ● Interpret data in tables and graphs, and recognize equations that summarize data. ● Use dimensional analysis to check the validity of	Meeting Point Lab ➢ Students will predict where two battery-operated cars will collide if they are released from opposite ends of the lab table at different times. Match the Graph Simulation ➢ Students will match and create graphs based on a computer simulation of a car undergoing various types of motion. Free-Fall Investigation Lab ➢ Students will design an experiment to determine and compare the acceleration of two objects dropped simultaneously. Projectile Motion Challenges ➢ Using a projectile launcher, students will be given a series of challenges such as placing a ring stand at a maximum height, or placing a cup at the point where a marble will land.	Hands on laboratory assessments (Meeting Point Lab, Free-Fall Investigation, Projectile Motion Challenges, Marble in a Cup Lab) Lab Simulations (Moving Man Gizmo, Match the Graph Simulation, Vector Gizmo). Quizzes on major concepts. Homework to reinforce major concepts. Unit Test.

	expressions. ● Perform order of magnitude calculations. ➢ How is motion described? ● Describe motion in terms of displacement, time, and velocity. ● Calculate the displacement of an object traveling at a known velocity for a specific time interval. ● Calculate the velocity of a moving object. ● Construct and interpret graphs of position vs time and velocity vs time. ➢ What is acceleration? ● Describe motion in terms of changing velocity. ● Compare graphical representations of accelerated and non-accelerated motion. ● Apply kinematic equations to calculate distance, time, or velocity under conditions of constant acceleration. ➢ How to falling objects behave? ● Relate the motion of a free falling body to motion with constant acceleration. ● Calculate displacement, velocity, and time at various posits in the motion of a freely falling	Marble in a Cup Lab ➢ Students will determine the starting point for a car so that a ball in free-fall will land in a cup attached to the back of the car as it passes beneath it. Vector Virtual Lab (Gizmo) ➢ Manipulate the magnitudes and directions of two vectors to generate a sum and learn vector addition. Adding Vectors Activity ➢ Students will add vectors both graphically and mathematically, and then compare their results. Paper River Lab ➢ Students explore relative motion using a toy car and a paper river (adding and subtracting vectors) Problem Solving Examples and Practice Class discussion and guided note taking	

| | | object. | |
| | | Compare the motion of different objects in free fall. | |

➢ What is a vector?
- Distinguish between a scalar and a vector.
- Add and subtract vectors using the graphical method.
- Multiply and divide vectors by scalars.

➢ How are vectors used?
- Identify appropriate coordinate systems for solving problems with vectors.
- Apply the Pythagorean theorem and tangent functions to calculate the magnitude and direction of a resultant vector.
- Resolve vectors into components using sine and cosine.
- Add vectors that are not perpendicular.

➢ What is projectile motion?
- Recognize examples of projectile motion.
- Describe the path of a projectile as a parabola.
- Resolve vectors into their components and apply the kinematic equations to solve problems involving

	projectile motion.
	➢ What is relative velocity?
	  ● Describe situations in terms of frame of reference.
	  ● Solve problems involving relative velocity.		