

Planned Course: Honors Physics Unit # 4: Momentum Estimated Time: 4 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) <ul style="list-style-type: none"> ● Skills/Knowledge 	Activities/Strategies/Study Skills (identify some activities as remedial or enrichment activities)	Assessments (include types and topics)
<p>Big Ideas:</p> <p>Big Idea 3: The interactions of an object with other objects can be described by forces.</p> <p>Big Idea 4: Interactions between systems can result in changes in those systems.</p> <p>Big Idea 5: Changes that occur as a result of interactions are constrained by conservation laws.</p> <p>PA Academic Standards:</p> <p>3.2.10.B1:</p> <p>Describe how interactions between objects conserve momentum.</p> <p>3.2.12.B2:</p> <p>Explain how energy flowing through an open system can be lost.</p>	<p>➤ What is linear momentum?</p> <ul style="list-style-type: none"> ● Compare the momentum of different moving objects. ● Compare the momentum of the same object moving with different velocities. <p>➤ What is impulse?</p> <ul style="list-style-type: none"> ● Identify examples of change in the momentum of an object. ● Describe changes in momentum in terms of force and time. <p>➤ Is momentum conserved?</p> <ul style="list-style-type: none"> ● Describe the interaction between two objects in terms of the change in momentum of each object. ● Compare the total momentum of two objects before and after they interact. 	<p>Conservation of Linear Momentum Lab</p> <ul style="list-style-type: none"> ● Using a track and collision carts, students will observe seven different collisions and make conclusions about momentum conservation in real life situations. <p>Bumper Design Lab</p> <ul style="list-style-type: none"> ● Students will design a paper bumper that will soften the impact of the collision between a cart and a fixed block of wood. Their designs are evaluated by the shape of an acceleration-time graph. <p>2D Collisions Virtual Lab (Gizmo)</p> <ul style="list-style-type: none"> ● Students will investigate elastic collisions in two dimensions using two 	<p>Hands on laboratory assessments (Linear Momentum Lab, Bumper Design Lab, Ballistic Pendulum Lab)</p> <p>Lab Simulations (2D Collision Gizmo).</p> <p>Quizzes on major concepts.</p> <p>Homework to reinforce major concepts.</p> <p>Unit Test.</p>

<p>Demonstrate how the law of conservation of momentum and conservation of energy provide alternate approaches to predict and describe the motion of objects.</p>	<ul style="list-style-type: none"> ● State the law of conservation of momentum. ● Predict the final velocities of objects after collisions, given their initial velocities. <p>➤ What are the differences between types of collisions?</p> <ul style="list-style-type: none"> ● Identify different types of collisions. ● Determine the decrease in kinetic energy during perfectly inelastic collisions. ● Compare conservation of energy and conservation of momentum in perfectly inelastic and elastic collisions. ● Find the final velocity of an object in perfectly inelastic and elastic collisions. 	<p>frictionless pucks. The mass, velocity, and initial position of each puck can be modified to create a variety of scenarios.</p> <p>Ballistic Pendulum Lab</p> <ul style="list-style-type: none"> ● Students will be able to determine the initial velocity of a projectile based on the height reached by a pendulum that the projectile embeds itself into after fired. <p>Problem Solving Examples and Guided Practice</p> <p>Class discussion and guided note taking</p>	
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