MYP/3D Science Unit Planner

Marietta City Schools

Grade & Course: Physics	**Topic:** Momentum	**Duration:** 4 weeks
Teachers: Physics PLC Teachers		

Georgia Standards and Content:

SP3. Obtain, evaluate, and communicate information about the importance of conservation laws for mechanical energy and linear momentum in predicting the behavior of physical systems.

Construct an argument supported by evidence of the use of the principle of conservation of momentum to
Explain how the brief application of a force creates an impulse.
Describe and perform calculations involving one dimensional momentum.
Connect the concepts of Newton's 3rd law and impulse.
Experimentally compare and contrast inelastic and elastic collisions.

Narrative / Background Information

Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)

Basic understanding of momentum
Basic p=mv calculations (triangle method)

Year-Long Anchoring Phenomena: (LEARNING PROCESS)

The laws of physics dictate the interactions of our physical world.

Unit Phenomena (LEARNING PROCESS)

Cars are much safer now than they were 100 years ago.

MYP Inquiry Statement:

Modeling transfers of momentum to predict the outcome of car crashes.

MYP Global Context:

Scientific and Technical Innovation

Approaches to Learning Skills:	**Disciplinary Core Ideas: (KNOWLEDGE & SKILLS)**	**Crosscutting Concepts: (KNOWLEDGE & SKILLS)**
Research Skills Thinking Skills Collaboration Skills Communication Skills	Momentum Impulse Universal Gravitation Transfer of Momentum	Cause and Effect (CC & MYP) Systems and Systems Models (CC & MYP)

		MYP Key and Related Concepts: Cause and Effect Systems

Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)
Misconception: Longer collisions cause the forces to increase.
Difference between conservation of momentum and energy in elastic and inelastic collisions.

Key Vocabulary: (KNOWLEDGE & SKILLS)
Momentum
Impulse
Elastic, Inelastic, and Explosion collisions

Inquiry Questions:

Factual-

What is equilibrium?
How can momentum be calculated?
What is the change in momentum the same as?

Conceptual-
In what scenarios is momentum conserved?
In which collisions is kinetic energy conserved?

Debatable-
How can a car be designed to be safer in a collision?

MYP Objectives	**Summative assessment**
Momentum Summative Test: MYP A	Relationship between summative assessment task(s) and statement of inquiry: The assessments measure how well students can determine how changes in mass and velocity impact the total momentum and impulse of an individual object and system

Momentum Need to Know - https://docs.google.com/document/d/1anGMcP1Dql9JsRwpRT-Ghhme8_hNvDMdJfYmBrguD60/edit?usp=sharing

Learning Activities and Experiences	Inquiry & Obtain: (LEARNING PROCESS)	Evaluate: (LEARNING PROCESS)	Communicate: (LEARNING PROCESS)
Week 1:	Students will be presented with the phenomenon and asked to reflect on what is happening – Students will be provided guided notes and open discussion with the teacher will occur as notes are presented using demonstrations to show concepts.	Students will be given a CFA over this material to check understanding	Students will complete a discussion board in Schoology to discuss the phenomena and ask questions about class content
Week 2:	Students will toss water balloons between each other taking a step back with each toss. Students will observe what they naturally do to prevent the water balloons from breaking. Students will then throw the balloons at a wall to compare against the process of catching the balloons.	Students will explain what occurs at the time of the collision when catching the balloons compared to throwing them into the wall. Using the concepts of impulse and momentum, students will then discuss how this affects the force exerted on the water balloon when accelerating.	Student groups will be given various other scenarios to analyze, such as car wrecks and rocket launches. They will explain through the lens of safety how increased time reduces force. Groups will then share scenarios with each other.
Week 3:	Students will observe low friction carts in simulation and in laboratory exercises of different masses colliding in different methods (bouncing, sticking, exploding).	Students will qualitatively record observations about the motion of the carts in each scenario and calculate the changes in velocity through conservation of momentum checking their answers with real life results.	Student groups will be randomly assigned a collision scenario to work out on a white or digital board and demonstrate the collision in the lab to another group.

Week 4: Remediation	Students complete a review quiz to diagnose strengths and weaknesses in the content.	Students complete review activities based upon quiz results.	

Resources (hyperlink to model lessons and/or resources):
Discovery Education Science Techbook
Momentum and Impulse Schoology Unit

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
PLC members planned together and shared resources to prepare for teaching the unit as well as creating CFA and CSA materials before the unit is taught.	PLC members meet weekly to discuss strategies that worked and did not work, discussed CFA and CSA results and the questions where students performed below the set goal (70% passing).	Collaborated on updating information from the unit and how we can improve next year.