

Lesson Plan

Title	
Motion and Forces PBL Activity	
Primary Subject Area	
Physical Science	
Grade Level	
Freshman	
Overview	
Students will study the evolution of the automobile and use changes to the model of a car to understand a variety of topics on motion and forces. During this unit study, students will complete a problem-based learning activity that will span several weeks.	
Approximate Duration	
3 weeks	
MA Frameworks	
1.4 Interpret and apply Newton's three laws of motion. 2.5 Provide and interpret examples showing that linear momentum is the product of mass and velocity, and is always conserved (law of conservation of momentum). Calculate the momentum of an object.	
Interdisciplinary Connections	
Connections to engineering and mathematics	
Lesson Objectives	
Students can apply Newton's laws to real-world situations.	
Lesson Materials and Resources	
Empty soda can with oval cut out Wheels & axels Ramp Balloon man Boch auto shop	
Technology Tools and Materials	
RM EasiTeach YouTube Guest Speakers	
Background Information	
Experience riding in a car	
Useful Vocabulary	
New Vocabulary Word	Meaning
Newton's 1 st law	
Newton's 2 nd law	
Impulse	
momentum	

Essential Questions to be answered; Grand Challenges
How can you design a soda can car that will effectively keep a balloon passenger safe during a collision?
Misconceptions
Students often think that the crumpling of cars indicates a 'bad accident' when in fact, cars are meant to crumple to reduce the impulse on the passengers.
Lesson Procedures
1. Students will take a tour of the Boch Collision center in Norwood and see vehicles damaged in an accident. A repairman will speak to the students about this history of vehicle safety. 2. Students will brainstorm how to create a soda can car that will keep a balloon passenger safe during a crash. 3.
Assessment Procedures
Students will be assessed on a 3-part system as designed by the STEM PBL website: http://www.pblprojects.org . The three parts include scores on content knowledge, conceptual knowledge, and problem solving ability. Content knowledge will be assessed through a standard test given throughout the science department to make sure students know basic terminology for the unit. The conceptual knowledge portion will be assessed through knowledge application questions that could be on a daily or weekly basis during the unit of study. The problem solving ability will be assessed based on the students ability to design a soda can car that can successfully transport the balloon man
Accommodations/Modifications
I teach inclusion science and have a few students with learning disabilities that may need additional help to complete the project successfully. One modification I may need to make is have a sheet where each student in the group is responsible for a certain part of the project so that the LD has an equal chance to participate with his/her group members.
Reproducible Materials
See attached
Explorations and Extensions
The building and construction of this car can also be used in future lessons regarding friction, heat and energy. I am considering possibly extending the project to see if students could further modify their car to increase its GPE conversion to KE down a ramp.
Lesson Development Resources
Pblprojects.org Sciencebuddies.com Stempbl.org
Reflections
Contact Information
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