Problem-Based Learning Unit Template

Topic

"Re-Pimp Our Ride": A Force and Motion PBL for 4th Grade

Goals/Objectives/SOL

Science Process Skills- use experimental design in scientific inquiry, use the language of science to communicate understanding, investigate phenomena using technology, apply scientific concepts, skills and processes to everyday experiences and experience the richness and excitement of scientific discovery of the natural world through collaborative quest for knowledge and understanding and develop an understanding of the interrelationship of science with technology, engineering and math.

SOL 4.1 and 4.2:

Scientific Investigation, Reasoning, and Logic

4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) distinctions are made among observations, conclusions, inferences, and predictions;
b) objects or events are classified and arranged according to characteristics or properties;
c) appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units;
d) appropriate instruments are selected and used to measure elapsed time;
e) predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;
f) independent and dependent variables are identified;
g) constants in an experimental situation are identified;
h) hypotheses are developed as cause and effect relationships;
i) data are collected, recorded, analyzed, and displayed using bar and basic line graphs;
j) numerical data that are contradictory or unusual in experimental results are recognized;
k) data are communicated with simple graphs, pictures, written statements, and numbers;
l) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
m) current applications are used to reinforce science concepts.

Force, Motion, and Energy

4.2 The student will investigate and understand characteristics and interactions of moving objects. Key concepts include

a) motion is described by an object's direction and speed;
b) changes in motion are related to force and mass;
c) friction is a force that opposes motion; and
d) moving objects have kinetic energy.

Theme

How does the impact of forces affect the safety of transportation vehicles?

Problem Question

What features in vehicles best protect travelers from forces that act on them?

Scenario

A recent Lynchburg Police Dept. study reported to city council reveals that a higher percentage of accidents are occurring in local taxi cabs. An area taxi company is seeking proposals from young, upcoming engineers for safer, more creative modes of future transportation.

Student Role

Transportation Engineers

Resources

Possible Guest Speakers:
Danny Johnson, Ben Beverly Crider Owner/Operators of Allied Taxi Co.
Leland Melvin- Retired Astronaut
Aeronautics Professor-LU (or Veronica Allen, pilot)
School or City Bus Driver
Police Officer
Transportation Engineer
Harbor Inn Hot Air Balloon Owner
Train Engineer
City Council Member (Trenay Tweedy)

Possible Field Trips: Snowflex-LU, Local Car dealership, Insurance Institute of Highway Safety-near Charlottesville- Crash Test Site

Comment [JTC1]:

Books- Roller Galimoto, The Boy Who Harnessed the Wind, Toy Boat, Cloudy with a Chance of Meatballs Coaster

Websites- Brainpop, Study Jams, Youtube, FearofPhysics (Basic Interactions),

How Stuff Works, Roller coasters

Culminating Activity

Devise a plan and create a safer, more creative mode of futuristic transportation for local taxi company to offer citizens. You will communicate your plan to a panel of taxi owners/operators, a police officer, and a city council member.

Created by: **Ms. Johnson, STEM Resource Teacher Dearington Elementary School for Innovation, Lynchburg City Schools**