Algebra Vehicle Data Investigation Grades 9-12

Objectives: Students will explore algebraic functions and real-world applications by analyzing vehicle data. They will research vehicle specifications, create linear equations to model fuel efficiency and cost, and use these equations to compare different vehicles. Through this investigation, students will strengthen their understanding of functions, rates of change, and systems of equations.

Common Core Mathematics Standards:

- **HSA-CED.A.2:** Create equations in two or more variables to represent relationships between quantities.
- **HSA-REI.C.6:** Solve systems of linear equations exactly and approximately.
- **HSF-IF.B.6:** Calculate and interpret the average rate of change of a function.
- **HSF-IF.C.7:** Graph functions expressed symbolically.

Materials:

- Calculator or graphing tool
- Access to internet for vehicle data research

Directions:

Step 1: Gather Vehicle Data

Choose a vehicle (your family's car, a teacher's car, or one parked outside with permission). Record or research the following:

Data Point	Value
Vehicle make/model	
Average miles per gallon	
Tank capacity in gallons	
Current gas price per gallon	

Step 2: Write and Analyze Equations

1. **Total Driving Distance Function**
   Let $D(x)$ represent the total distance (in miles) the car can travel with x gallons of gas.
   Use the MPG value.

   Write the function:

   $D(x)$ = _____ $\cdot\ x$

2. **Fuel Cost Function**
   Let $C(x)$ represent the cost (in dollars) to fill the tank with x gallons of gas.
   Use the current gas price.

   Write the function:

   $C(x)$ = _____ $\cdot\ x$

3. **Maximum Range on Full Tank**
   Use your function from #1 to calculate how far the car can go on a full tank.

   $D(tank\ capacity)$ = _____ miles

4. **Full Tank Cost**
   Use your function from #2 to calculate the cost of a full tank.

   $C(tank\ capacity)$ = $ _____

Step 3: Comparing Vehicles

Pick a second vehicle (different make/model/year). Compare both using equations and analysis:

- Which vehicle travels farther on a full tank?
- Which one costs less to fuel?
- Plot both distance functions on a graphing calculator or online graphing tool.
- At what gallon amount do both vehicles travel the same distance?

Bring this lesson to the museum!

Help students connect their learning to real-world contexts by conducting this lesson plan at Klairmont Kollections using vehicles on display!