Applied Math Name _____
Gas vs Hybrid vs Electric Date _____

Goal: To use a spreadsheet to calculate and compare the total cost of ownership (TCO) of three types of vehicles: gas, hybrid and electric (or other alternative fuel)

Essential Question: Is it worth it to buy an electric or hybrid vehicle instead of gas?

Skills Used:

- make table
- use TREND, *, + functions
- insert graph/chart
- Embed hyperlinks
- Insert pictures

Instructions:

You will create a spreadsheet that contains researched data about the following information. All data needs a link, formula or note for justification.

You will find three **comparable** cars: one gas, one hybrid and one electric. Using only the base model (no fancy additions), collect data for the table. Finding the base price is fairly straight-forward. However, calculating the ongoing cost will take some creative thinking. For gas and hybrid, to calculate the annual gas cost looks like this:

$$\frac{\text{miles per year}}{\text{miles per gallon}} \cdot \text{dollars per gallon}$$

Miles per gallon will be found on the product pages of the gas and hybrid cars. For electric, you need find a different unit rate: miles per kwh. Here is how to calculate annual "fuel" cost for electric car:

$$\frac{\text{miles per year}}{\text{miles per kwh}} \cdot \text{dollars per kwh}$$

To calculate the miles per kwh:

$$\frac{\text{miles per charge}}{\text{kwh of battery}}$$

The current cost per kwh of electricity in Boylston is $0.1445.

Oil change costs vary. Research a local shop for rates. Provide link.

After the data is gathered and calculated in the first table, you will calculate the ongoing total cost of ownership (TCO). In the second table, use the TREND function or build your own formula, predict the TCO after 10 years. Then you will select the second table and Insert > Chart to visualize.

Applied Math
Gas vs Hybrid vs Electric

Finally, in a separate Google Doc, write 2-4 paragraphs describing the process and your answer. Consider the following prompts when writing:

1. Is buying a hybrid or electric vehicle worth it to you? Explain.
2. What are your preconceived notions regarding gas/electric/hybrid?
3. Besides monetary, what are other factors to consider when buying these types of vehicles? Where do the batteries come from? Where does the electricity come from?
4. How does the original price compare to the TCO?
5. Which car has a higher resale value?
6. Any other observations?

Common Types of Vehicles

Gas: Toyota Camry, Nissan Versa, Ford Escape, Chevy Silverado, BMW i Series, VW Jetta
Hybrid: Toyotas Camry, Prius, Ford Escape Hybrid, Chevy Volt
Electric: Nissan Leaf, Chevy Bolt, Tesla, BMW i3, VW eGolf

Sample Comparisons

Small: Toyota Corolla, Toyota Corolla Hybrid, Nissan Leaf
Sedan: Honda Accord, Honda Accord Hybrid, Tesla Model 3

Tables

Car Costs										
Type	Model Name	Base Cost	Charger Cost	8-year Replacement		Miles per Unit		Unit Cost of "Fuel"	Annual Cost for "Fuel"	Annual Oil change costs
Gas				Transmission		Gal				
Hybrid				Battery + Transmission		Gal				
Electric				Battery		Kwh				

Running Total Cost of Ownership			
Year	= from above	= from above	= from above
0			

Applied Math
Gas vs Hybrid vs Electric

1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
17	=TREND		

Rubric

A: Exceptional	Proficient Plus: Pictures and links of possible cars that you could possible buy from a dealership. Paragraph takes into account other factors beyond monetary, including social and ecological factors. Use TREND for gas price prediction.
B: Proficient	Data is accurate. Delete unused rows and columns. Organization is clean. Good use of shading. Spreadsheet auto calculates. Links work well. Paragraph is insightful and accurate.
C: Basic	Some missing data. Not full auto calculation.
D: Developing	Significant portions are missing from spreadsheet.
F: Inadequate	Incomplete by missing most information.