

**Question 3: Analyze an Environmental Problem
and Propose a Solution (Doing Calculations)****10 points**

A **Identify** an anthropogenic source of particulate matter, other than from motor vehicles. **Point 01**

Examples of acceptable responses may include the following:

- Coal/fossil fuel combustion
- Industrial exhaust
- Construction/demolition
- Waste incineration
- Mining
- Burning of biomass
- Anthropogenically caused wildfires
- Unpaved roads
- Agricultural fields

B One way to reduce pollutants associated with motor vehicles is to use a vapor recovery nozzle. **Describe** one way a vapor recovery nozzle is used to reduce atmospheric pollution. **Point 02**

Acceptable description point:

- It prevents fumes/vapors from escaping into the atmosphere when gassing/fueling (a motor vehicle).

C **Explain** how a decrease in the number of people commuting to work in their personal vehicles could lead to a reduction in acid rain. **Point 03**

Examples of acceptable responses may include the following:

- (A decrease in commuting) would result in lower nitrogen oxide/sulfur oxide emissions from cars/vehicles.
 - (A decrease in commuting) would lead to less nitric acid/sulfuric acid in the atmosphere.
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D	Calculate the percent change in gas mileage between the gasoline-powered SUV and the hybrid SUV based on the data provided. Show your work. One point for the correct setup to calculate the percent change in gas mileage. Examples of acceptable responses may include the following: • $(36 \text{ mpg} - 22 \text{ mpg}) / 22 \text{ mpg} \times 100$ • $(36 - 22) / 22 \times 100$	Point 04
	One point for the correct calculation of the percent change in gas mileage. Examples of acceptable responses may include the following: • 63.6% increase • 63.6% • 63.6 • 64% • 64	Point 05
E	Calculate how many more miles the owner can drive in the hybrid SUV in the city than they could have driven in the gasoline-powered SUV. Show your work. One point for the correct setup to calculate how many more miles the hybrid SUV can drive than the gasoline-powered SUV. Examples of acceptable responses may include the following: • $(14 \text{ gallon} \times 36 \text{ mpg}) - (14 \text{ gallon} \times 22 \text{ mpg})$ • $(14 \times 36) - (14 \times 22)$ • $14 \times (36 - 22)$	Point 06
	One point for the correct calculation of how many more miles the hybrid SUV can drive than the gasoline-powered SUV. Examples of acceptable responses may include the following: • 196 • 200	Point 07
F	Propose a realistic solution that schools could implement to decrease energy use for heating and cooling, other than a reduction in the amount of time the school building is occupied. Examples of acceptable responses may include the following: • Implement green building design features • Open windows to reduce use of air conditioning • Use energy-efficient heating and cooling equipment • Adjust the thermostat to reduce use of heat and air conditioning • Install conservation landscaping	Point 08

G **Calculate** the energy use in the school building in kilowatts per year using LED light bulbs. **Point 09**

Show your work.

One point for the correct setup to calculate the energy use in the school building in kWh/year using LED light bulbs.

Examples of acceptable responses may include the following:

- $(2.8 \times 10^4 \text{ bulbs}) \times 0.0085 \text{ kilowatt} \times 2,340 \text{ hours}$
- $(2.8 \times 10^4) \times 0.0085 \times 2,340$

One point for the correct calculation of the energy use in the school building in kWh/year using LED light bulbs. **Point 10**

Examples of acceptable responses may include the following (if units are included in the response, kWh/year or kW/year are accepted):

- 556,920
 - 5.6×10^5
 - 5.6E5
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