

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.

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. **Point 04**

One point for the correct setup to calculate the percent change in gas mileage.

Examples of acceptable responses may include the following:

- $(36 \text{ mpg} - 22 \text{ mpg}) / 22 \text{ mpg} \times 100$
- $(36 - 22) / 22 \times 100$

One point for the correct calculation of the percent change in gas mileage. **Point 05**

Examples of acceptable responses may include the following:

- 63.6% increase
- 63.6%
- 63.6
- 64%
- 64

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. **Point 06**

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:

- $(14 \text{ gallon} \times 36 \text{ mpg}) - (14 \text{ gallon} \times 22 \text{ mpg})$
- $(14 \times 36) - (14 \times 22)$
- $14 \times (36 - 22)$

One point for the correct calculation of how many more miles the hybrid SUV can drive than the gasoline-powered SUV. **Point 07**

Examples of acceptable responses may include the following:

- 196
- 200

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. **Point 08**

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

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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