

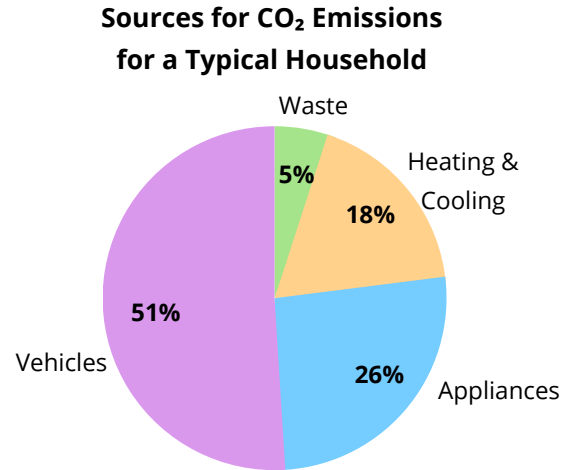
Try Your **V** HARDEST MATH PROBLEM

GRADE 7

At Sunny Middle School, Ms. Addison’s class is investigating how greenhouse gases (GHGs) contribute to global climate change. They wrote their research on note cards:

- Greenhouse gases cause climate change by trapping heat on the planet.
- Greenhouse gases contribute to smog and air pollution, which can cause respiratory diseases, like asthma.
- Extreme weather, disruptions to the food supply, and increased wildfires are also caused by greenhouse gases.

“Where do greenhouse gases come from?” Mia asked. “One of the most common greenhouse gases is carbon dioxide, also known as CO₂. People release CO₂ into the atmosphere when we burn fossil fuels (like coal and natural gas) for energy and transportation,” Ms. Addison answered.



The class examined the graph. The source for the largest percentage of CO₂ emissions for a typical household was vehicles. The students conducted some research and found:

- Highway vehicles release about 1.7 billion tons of GHGs each year.
- Each gallon of gasoline burned creates 20 pounds of GHG.
- A typical vehicle releases 6 to 9 tons of GHG into the atmosphere each year.

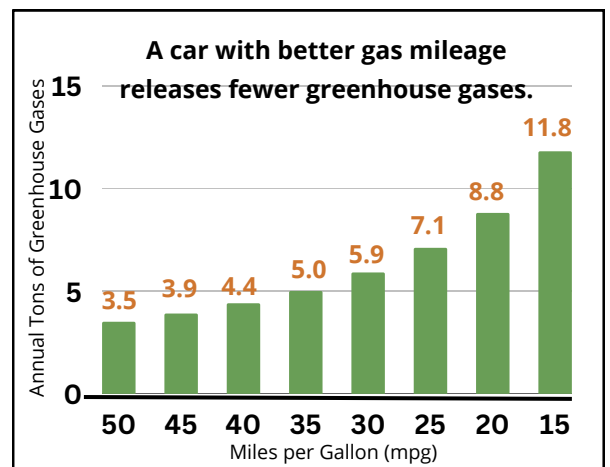
Solve the Problem

For their group project, Mia and Ichiro researched hybrid cars that combine gas and an electric motor. “Awesome, so it consumes less fuel and emits less CO₂ into the environment,” Ichiro said.

“While hybrid cars are better for the environment, I’m seeing that some people are hesitant to buy one because of the higher purchase price,” Mia noted.



They found the graph to the right, which shows the miles per gallon (MPG) and the annual tons of GHG produced by 8 different types of cars.



If each gallon of gasoline burned created 20 pounds of GHG, and the price of gasoline was \$2.454 per gallon, how much money was saved annually on gas by the car that got 40 miles per gallon when compared to the car that got 20 miles per gallon? Provide your answer to the hundredths place.

Note: 1 ton = 2,000 pounds.

Try Your
THE HARDEST MATH PROBLEM
CHALLENGE 1 ANSWER KEY – GRADE 7

Although each problem has one correct numeric solution, there are multiple pathways students can take to arrive at the answer. Students who answered Challenge 1 correctly are invited to enter Challenge 2!

Sample Solution

Step 1: To compare cost, you need to find the amount spent on gas for each car. Looking at the chart, you can see that the car averaging 40 mpg emitted 4.4 annual tons of GHG.

Step 2: Since 1 ton = 2,000 pounds, convert 4.4 tons into pounds by multiplying by 2,000.

$$4.4 \times 2,000 = 8,800 \text{ pounds GHG}$$

Step 3: Since 1 gallon of gas emitted 20 pounds of GHG, divide the pounds of GHG by 20 to find the number of gallons of gas that emitted that amount of GHG.

$$8,800/20 = 440 \text{ gallons of gas}$$

Step 4: Multiply the gallons of gas by \$2.454, the price of gas per gallon, to find out how much was spent on gas.

$$440 \times \$2.454 = \$1,079.76$$

Step 5: To find out how much money was saved compared to the car that averaged 20 mpg, we need to repeat the first 4 steps to figure out how much money was spent on gas. Looking at the chart, the car that averaged 20 mpg emitted 8.8 annual tons of gas.

Step 6: Repeat steps 2, 3, and 4 using 8.8 annual tons to figure out how much was spent on gas for the car.

$$\begin{aligned} 8.8 \times 2,000 &= 17,600 \text{ pounds GHG} \\ 17,600/20 &= 880 \text{ gallons of gas} \\ 880 \times \$2.454 &= \$2,159.52 \end{aligned}$$

Step 7: Find the difference in the two amounts spent on gas.

$$\$2,159.52 - \$1,079.76 = \$1,079.76$$

Final Answer: **\$1,079.76** was saved annually on gas for the car that averaged 40 miles per gallon compared to the car that averaged 20 miles per gallon.