

Try Your THE HARDEST MATH PROBLEM GRADE 7

Mia sat on the steps of Sunny Middle School at recess, lost in thought. "Hey, Mia!" Liam called. "What are you thinking about?"

"What we learned about the climate and cars," she said, pointing to the cars passing on the street.

"You mean the levels of carbon dioxide (CO₂) that are causing the planet to warm?"

"Yeah, and how much CO₂ comes from cars," Mia sighed. Then suddenly she stood up and waved Ichiro, Jazmyn, and Ruben over. "I think we should do something to help!" When everyone gathered around, Mia asked, "Want to start a club about climate change and our community?"

"Yes! We can call ourselves the Climate Crew!" Ruben suggested.

"I'm in," Ichiro said. "We can write letters to the government and businesses."

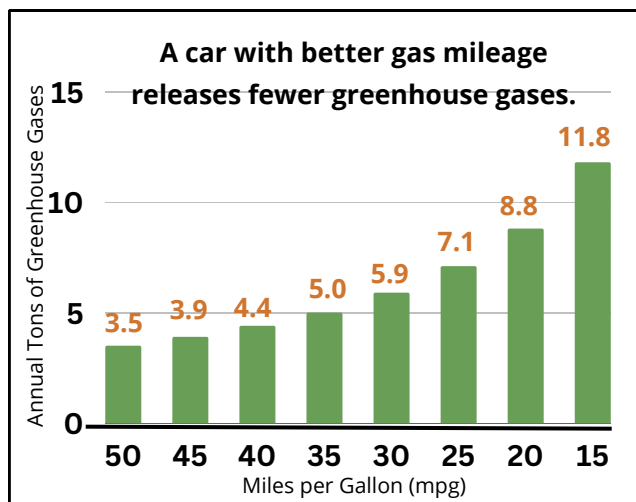
"And we can do our part at home with our families," Jazmyn said.

"Let's get to work," said Liam, pulling out his notebook.

Solve the Problem

Ichiro took out his phone. "*Gas mileage* is the number of miles a car can drive per one gallon of gas. Here's a graph I saw about greenhouse gas emissions and a car's gas mileage."

"I wonder what this means for my family's cars ..." Jazmyn mused.



Jazmyn's family owns two cars: one car gets 15 miles per gallon (mpg) and one car gets 30 mpg. She suggested that her family consider trading in the car that 15 mpg for a car that gets 25 mpg, as well as trading in the car that gets 30 mpg for a car that gets 40 mpg. While car shopping, the family another possibility: Keep the car that gets 30 mpg and trade the car that gets 15 mpg for a car that gets 35 mpg.

The family considers both options (Jazmyn's original idea of trading both cars as well as the idea of keeping one car and trading one car). They choose the option that gives them the greatest decrease in greenhouse gases (GHG). **What will be the family's percent decrease in annual tons of GHG produced by their two vehicles? Round the answers to the nearest whole percent.**

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THE HARDEST MATH PROBLEM
CHALLENGE 2 ANSWER KEY – GRADE 7

Although each problem has one correct numeric solution, there are multiple pathways students can take to arrive at the answer.

Sample Solution

Step 1: Get c , the total tons of GHG produced by the family's two current cars that get 15 mpg and 30 mpg, from the bar graph.

$$c = 11.8 \text{ tons} + 5.9 \text{ tons}$$

$$c = 17.7 \text{ tons of GHG}$$

Step 2: Get n , the total annual tons of GHG that will be produced by the family's potential two new vehicles that will get 25 mpg and 40 mpg, from the bar graph.

$$n = 7.1 \text{ tons} + 4.4 \text{ tons}$$

$$n = 11.5 \text{ tons of GHG}$$

Step 3: Get m , the total annual tons of GHG that will be produced by the family's potential one new vehicle that will get 35 mpg and their current vehicle that gets 30 mpg, from the bar graph.

$$m = 5.0 \text{ tons} + 5.9 \text{ tons}$$

$$m = 10.9 \text{ tons of GHG}$$

Step 4: Compare n and m to determine which option will give the family the greatest decrease in GHG. Since $10.9 < 11.5$, the option of trading in the vehicle that gets 15 mpg for a vehicle that gets 35 mpg and keeping the vehicle that gets 30 mpg will give the family a greater decrease in GHG produced by their two vehicles.

Step 5: Find the difference, d , between c and m .

$$d = 17.7 \text{ tons} - 10.9 \text{ tons}$$

$$d = 6.8 \text{ tons of GHG}$$

Step 6: Find the percent decrease of the family's annual tons of GHG produced by their two vehicles, p .

$$\frac{6.8 \text{ tons}}{17.7 \text{ tons}} = \frac{p}{100}$$

$$17.7p = 680$$

$$p = 38.418\%$$

Final Answer: By trading in the car that gets 15 mpg for a car that gets 35 mpg and keeping the car that gets 30 mpg, the family will have a **38% decrease (or -38% change)** in the tons of GHG produced by their vehicles each year.