MATHCOUNTS® Problem of the Week Archive

Road Trip – August 15, 2022

Problems & Solutions

Susanna and her family take a road trip from Washington, DC to Duck, NC. On the way, they stop for lunch in Richmond, VA, which was 106 miles from DC and 174 miles from Duck. They traveled at an average speed of 58 mi/h from DC to Richmond, and after lunch, it took them 3 hours 12 minutes to get to Duck. What was Susanna's family's average speed in miles per hour for the entire trip from Washington, DC to Duck, NC (disregarding the time spent at rest stops, lunch, etc.)? Express your answer as a decimal to the nearest tenth.

For this question, you'll need to use the equation rate = distance ÷ time. In order to find the average speed for the entire trip, you'll need to first calculate the total distance and the total time it took to get there. The total distance is 106 miles + 174 miles = 280 miles. The total time it took to travel from Washington, DC to Richmond, VA at an average speed of 58 mi/h is 58 = 106 ÷ x → x = 106/58 ≈ 1.8276 hours. We are told that the total time it took to travel from Richmond, VA to Duck, NC is 3 hours and 12 minutes. To convert this to hours, divide the 12 minutes by 60 and add it to 3 (hours): 3 + (12 ÷ 60) = 3.2. Therefore, the total time was approximately 1.8276 + 3.2 = 5.0276 hours. Now, divide the total distance by the total time to get 280 ÷ 5.0276 ≈ ***55.7*** *mi/h as the average speed for the entire trip, rounded to the nearest tenth.*

On the return trip, Susanna's family decides to stop to take a break in Williamsburg, VA, which is 126 miles from Duck and 153 miles from DC. If Susanna's family drove at a speed of 54 mi/h from Duck to Williamsburg, what must their average speed be to make it back from Duck to DC in the same amount of time it took them to go from DC to Duck (disregarding the time spent at rest stops, lunch, etc.)? Express your answer to the nearest whole number.

First, determine how much time they have left to get from Williamsburg to DC if they were to tie their time from the trip down. The time to travel from Duck, NC to Williamsburg, VA was 126 ÷ 54 ≈ 2.3333 hours. Now, subtract that from the time it took them to get from DC to Duck. That leaves 5.0276 – 2.3333 = 2.6943 hours. Now, divide the total distance left by the "time remaining" to get 153/2.6943 ≈ ***57*** *mi/h as the average speed Susanna's family must maintain to match the time on the way down, rounded to the nearest whole number.*

From the first portion of the return trip, by what percent do they have to increase the speed for the second portion of the return trip in order to make the trip from Duck to DC take the same amount of time that the trip from DC to Duck took in question 1? Express your answer as a decimal to the nearest tenth.

First, find the actual amount of increase required by subtracting the speed of the first portion of the trip from the speed of the second portion of the trip. You get 57 mi/h – 54 mi/h = 3 mi/h. Then, divide it by the speed from the first portion of the trip and multiply by 100: 3 mi/h ÷ 54 mi/h × 100 ≈ ***5.6****%.*

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From the first portion of the return trip, by what percent do they have to increase the speed for the second portion of the return trip in order to make the trip from Duck to DC take the same amount of time that the trip from DC to Duck took in question 1? Express your answer as a decimal to the nearest tenth.