

MATHCOUNTS[®] Problem of the Week Archive

A New School Year – August 28, 2023

Problems & Solutions

When Riya's alarm went off on the first day of her senior year in high school, she hit the snooze button and slept for another 10 minutes. When the alarm sounded the next time, Riya got up and immediately brushed and flossed her teeth, which took 5 minutes. A half hour later, Riya was showered and dressed. She then spent 45 minutes getting her hair and make-up just right. Next, Riya had a glass of milk and a bowl of microwave oatmeal for breakfast. Riya spent 30 minutes preparing and eating her breakfast. Twenty-four minutes later, at 8:39 a.m., Riya arrived at school ready to begin the new school year. At what time did Riya's alarm go off the first time?

After Riya's alarm went off the first time, and before she arrived at school, Riya did the following:

- | | |
|----------------------------|------------|
| ▪ Snoozed | 10 minutes |
| ▪ Brushed & flossed | 5 minutes |
| ▪ Showered & dressed | 30 minutes |
| ▪ Fixed hair & make-up | 45 minutes |
| ▪ Prepared & ate breakfast | 30 minutes |
| ▪ Traveled to school | 24 minutes |

TOTAL ELAPSED TIME: 2 hours 24 minutes

If Riya arrived at school at 8:39, her alarm went off the first time at 2 hours and 24 minutes before 8:39, which would have been $8:39 - 2:24 = 6:15$ a.m.

There are two different routes that Riya can take to get to school. The first route, which is 12 miles, gets her to school in 20 minutes. The second route is only 8 miles, but has more traffic lights, so it takes 24 minutes. Based on this information, in miles per hour, what is the absolute difference in Riya's average speeds for both routes?

For the first route, Riya can travel 12 miles in 20 minutes. Since 20 minutes is $20/60 = 1/3$ hour, Riya's rate would be $12 \div (1/3) = 12 \times 3 = 36$ mi/h. For the second route, Riya can travel 8 miles in 24 minutes. Since 24 minutes is $24/60 = 2/5$ hour, Riya's rate would be $8 \div (2/5) = 8 \times (5/2) = 20$ mi/h. The absolute difference in these rates is $|36 - 20| = 16$ mi/h.

At Riya's school, there are three parking lots with a total of 175 parking spaces. Three-fifths of these spaces are reserved for juniors and seniors who drive to school. There are twice as many parking spaces assigned to seniors as there are assigned to juniors. How many of the parking spaces at Riya's school are not assigned to seniors?

We are told that $\frac{3}{5}$ of the spaces are reserved for juniors and seniors. We are also told that the number of spaces for seniors is twice the number of spaces for juniors, meaning that $\frac{2}{3}$ of the spaces reserved for juniors and seniors are for seniors. It follows, then, that $\frac{2}{3}$ of $\frac{3}{5}$ of the 175 spaces, or $(\frac{2}{3}) \times (\frac{3}{5}) = \frac{2}{5}$ of the spaces are reserved for seniors. That means that $\frac{3}{5}$ of the spaces, or $(\frac{3}{5}) \times 175 = \mathbf{105}$ spaces are not reserved for seniors.

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