

# MATHCOUNTS<sup>®</sup> Problem of the Week Archive

## Labor Day Themes – September 6, 2021

### Problems & Solutions

On September 5, 1882, the first Labor Day parade was held in New York City with 20,000 workers marching up Broadway. Within the next few years, the idea spread from coast to coast, and all states celebrated Labor Day. Then in 1894, Congress voted it a Federal Holiday. Today, Labor Day is often seen as the end of summer. Many people try to get in one last summer vacation during this holiday, causing major traffic jams around the country. This year, it is estimated that 50.7 million Americans will be traveling over 50 miles from home by motor vehicle during the holiday weekend, with 59% of these travelers originating from the Southeast, Midwest and Northeast regions. The ratio of the numbers of travelers from these three regions is 6:5:4, respectively. How many travelers are originating from the Southeast, to the nearest tenth of a million?

*We know that the total number of travelers from these three regions is 59% of 50.7 million, which is  $0.59 \times 50.7$  million = 29.913 million travelers. Since the ratio is 6:5:4, we can set up an equation that says  $6x + 5x + 4x = 29.913$  million, which is equivalent to  $15x = 29.913$  million. Dividing both sides by 15, we see that  $x = 1.9942$  million. Therefore, the number of travelers from the Southeast region is  $6 \times 1.9942$  million = **12 million** to the nearest tenth of a million.*

In some states, many people will celebrate Labor Day by heading to the State Fair. Say there are three different prices for tickets into the fair. There are Pre-Fair tickets (bought before the fair and good for adults and children), Adult tickets (bought at the fair) and Child tickets (bought at the fair). The Zappone family paid \$32 for 5 Pre-Fair tickets and 1 Adult ticket. The Newill family paid \$26 for 2 Adult and 2 Child tickets. The Sira family paid \$25 for 1 Adult and 3 Child tickets. What is the price for 1 Pre-Fair ticket?

*You can solve this problem by setting up a system of equations, but you can also solve it with a little creative thinking. The Newills and the Siras both only bought Adult and Child tickets. The Newill's price was \$1 more than the Siras, so if you took away 1 Adult and 1 Child ticket from both of them, the Newills would still be paying \$1 more than the Siras and the Newills would have 1 Adult ticket and 1 Child ticket, while the Siras would only have 2 child tickets. Therefore, we can see that an Adult ticket is only \$1 more than a Child ticket. Going back to the Newill's original purchase then, you can change their Adult tickets to Child tickets and take \$2 off the price and see that it's like buying 4 Child tickets for \$24. That means that a Child ticket is \$6, an Adult ticket is \$7 and looking at the Zappone's purchase will show you that a Pre-Fair ticket must be \$5 ( $5 \times \$5 + \$7 = \$32$ ).*

Labor Day is also a day to shop... due to the many sales! Harley went into her favorite clothing store and saw that the shirt she wanted was on sale for 25% off. She also had a coupon that said she could take an additional 10% off any purchase. What single percent discount from the original price is equivalent to a 10% discount of an item already on sale at a 25% discount from the original price? Give your answer to the nearest tenth of a percent.

*The store's sale of 25% off means that Harley will only be paying 75% of the original price. Then, if Harley takes an additional 10% off the sale price, she is only paying 90% of the sale price, or 90% of 75% of the original price, which is  $0.90 \times 0.75 = 0.675$  or 67.5% of the original price. That would be equivalent to a single discount of  $1 - 0.675 = 0.325$  or **32.5%**.*

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### ***Problems***

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