MATHCOUNTS® Problem of the Week Archive

Back-to-School Shopping – August 23, 2021

Problems & Solutions

When paying for her back-to-school clothing purchase, Kristal learned that it was the final day of her state's tax-free holiday. Kristal decided to purchase a pair of earrings using the $15 she would have paid in taxes on her original purchase. If the tax rate is 6.25% what is the total purchase price Kristal paid for the back-to-school clothing and the earrings?

*Fifteen dollars must represent 6.25% of the total purchase price before the earrings, which we will call c. So, 0.0625c = 15. Dividing each side by 0.0625, we get c = 240. Therefore, the total amount Kristal paid for the clothing and earrings was 240 + 15 = **255** dollars.*

Eugene is purchasing clothing to make different outfits. Each outfit consists of a top, a bottom and a pair of shoes. Eugene found 2 pairs of shoes and 4 bottoms he would like to purchase. What is the minimum number of tops Eugene needs to purchase to make at least 35 different outfits? Express your answer as a whole number.

*Let the number of tops be t. Using the Fundamental Counting Principle, we see that the total number of outfits Eugene can make is 2 × 4 × t, which we need to be at least 35. That yields the inequality 8t ≥ 35. Dividing each side by 8, we get t ≥ 4.375. Therefore, to have a minimum of 35 outfits, Eugene must buy at least **5** tops.*

Gerald found a $24.99 backpack that he'd like to purchase from the sporting goods store. The current promotion involves scratching a card to reveal a discount that can be 5% off, 15% off or 25% off. Each of the three discount options is equally likely. After the discount is taken, a 6.5% tax is added. What is the probability that Gerald will pay less than $25 to purchase this backpack? Express your answer as a common fraction.

*If Gerald scratches a discount of 5%, he will pay 0.95 × 24.99 = $23.74 before tax; in total, he will pay 23.74 + (0.065 × 23.74) = $25.28 for the backpack. If Gerald scratches a discount of 15%, he will pay 0.85 × 24.99 = $21.24 before tax; in total, he will pay 21.24 + (0.065 × 21.24) = $22.62 for the backpack. If Gerald scratches a discount of 25%, we know he will pay less than the amount with the 15% discount, which is less than $25. With two of the three discount options, Gerald will pay less than $25 for the backpack, which is a probability of **2/3**.*

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