

MATHCOUNTS[®] Problem of the Week Archive

New School Clothes – August 20, 2018

Problems & Solutions

Nona went shopping to buy some new school clothes. At the first store she bought two pairs of pants, each originally priced \$30. Nona used a coupon that reduced the price of each item by 15%, and then a 5% sales tax was applied to the new subtotal. What was the total purchase price?

A 15% discount means that the sale price of each pair of pants was 85% of the original price, or $(0.85)(30) = \$25.50$, making the new subtotal was $25.50 \times 2 = \$51.00$. Applying a 5% sales tax means the total purchase price is 105% of this subtotal, or $(1.05)(51) = \mathbf{\$53.55}$.

At the next store Nona bought a \$50 dress and used two coupons, one for 20% off and one for 10% off. How much more would Nona have saved by using a single coupon for 30% off compared to using the 20% coupon and the 10% coupon?

The sale price of an item discounted 20% would be 80% of the original price. The sale price of an item discounted 10% would be 90% of the original price. Applying the 20% coupon and the 10% coupon results in a sale price that is $0.90 \times 0.80 = 0.72 = 72\%$ of the original price. The sale price of an item discounted 30% would be 70% of the original price. Applying a single 30% coupon results in a sale price that is 70% of the original price. Therefore, by using a single 30% coupon, Nona would have saved an additional $72 - 70 = 2\%$, or $(0.02)(50) = \mathbf{\$1.00}$ compared to using the 20% coupon and the 10% coupon.

After making a few more stops and a few more purchases, Nona went home. After putting away her new purchases, Nona noticed that she had 9 pairs of pants, 12 shirts and 3 belts. How many possible outfits can Nona make, each consisting of a pair of pants and a shirt and that may, or may not, include a belt?

There are $(9)(12) = 108$ combinations consisting of a pair of pants and a shirt. There are 3 belts but an outfit may, or may not, include a belt, thus there are 4 options. Therefore, the total number of possible outfits Nona can make with the clothes in her closet is $108(4) = \mathbf{432}$ outfits.

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