MATHCOUNTS® Problem of the Week Archive

Valentine's Day Treats – February 10, 2020

Problems & Solutions

According to "A History of Valentine's Day Cards in America" by T.M. Wilson, in 1847 Esther Howland was the first to mass-produce Valentine's Day cards. She made them out of lace, paint and expensive paper and each one was individually written by a skilled calligrapher. The average card sold for $7.50 while others cost as much as $50. If 10 cents in 1847 would be equivalent to $1.85 today, how much would the average card and most expensive card have cost today?

Since we are given a ratio of 10 cents to $1.85, we can set up 2 more ratios to find what $7.50 and $50 would convert to. Just remember to convert 10 cents to $.10 before beginning. An extended proportion would say that .10/1.85 = 7.50/x = 50/y. By cross-multiplying and solving for x and y, we would see people were spending what would be equivalent to ***$138.75*** *and* ***$925*** *for us today!*

Kelly decided to celebrate Valentine's Day for an entire month. She started giving her Valentine 1 candy heart on Jan. 14th, 2 candy hearts on Jan. 15th, 4 candy hearts on Jan. 16th, and continued doubling the amount of hearts each day until Feb. 14. If 200 candy hearts come in a bag, how many bags of candy hearts would Kelly need **just** for Feb. 14th?

This is an exponential growth problem that shows how quickly an amount can grow when repeatedly doubled. The first day, she gave 1 candy. The second day, she gave 1 × 2 candies. The third day, she gave 1 × 2 × 2 candies. She will keep multiplying by 2 until she gets to the 32nd day. Therefore, the amount of candy she'll need ***just*** *for Feb. 14th is 1 × 2^{31}. This is 2,147,483,648 pieces of candy. Dividing this by 200 for each bag of candy means she'll need* ***10,737,419 bags*** *just to cover Valentine's Day!*

For Valentine's Day Kevin wanted to send Mary Beth 11 balloons since that was her favorite number. In the store, plain-colored balloons cost $.75, multi-colored balloons cost $1.30, and extra-large balloons cost $1.50. How many different combinations of 11 balloons can Kevin buy if he only has $12.00?

Making an orderly chart may be the best way to approach this problem. Starting with buying as many of the extra-large balloons as possible, then methodically subtracting an extra-large balloon, and so on. Though he can afford 8 extra-large balloons, he then could not afford 3 more to make the 11 balloons needed, So, the most extra-large balloons he can afford is 5 ($7.50), leaving him just enough to buy 6 plain-colored balloons ($4.50). Then find possibilities with 4 extra-large balloons. Notice exchanging a multi-colored balloon for a plain-colored balloon raises the cost $.55. This may help when determining possibilities and finding patterns. Eventually, you will find ***24 possible combinations****!*

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