MATHCOUNTS® Problem of the Week Archive

Mother's Day – May 9, 2022

Problems & Solutions

Mother's Day is a holiday honoring mothers and is celebrated on the second Sunday in May in the United States. In 1914, President Woodrow Wilson declared the first national Mother's Day. Mother's Day has become one of the most commercially successful U.S. holidays.

Anna asked six of her friends for the age in years of their mothers.

Friend	Ashley	Dawn	Jennifer	Laura	Sarah	Shawna
Age in years	28	36	27	31	35	29

What is the positive difference between their mean and median age?

*To find the mean age, we'll add all the ages together and divide by the number of mothers: (28 + 36 + 27 + 31 + 35 + 29) ÷ 6 = 31. To find the median age, order the ages and find the middle value: 27, 28, 29, 31, 35, 36. Since there are an even number of ages, the median is the mean of the middle two values, (29 + 31) ÷ 2 = 30. Thus, the positive difference between the mean and the median is 31 – 30 = **1**.*

Bernt takes his mother to a restaurant for Mother's Day Brunch. They can select as much food as they want from the buffet for a cost of $15.00 each, or they can order from the à la carte menu and pay for each item separately.

À la Carte	Orange Juice	Toast	Cereal	2 Eggs	Bacon	Fruit	Potatoes
Cost	$1.50	$1.75	$1.50	$2.00	$1.75	$1.50	$1.50

Bernt orders the buffet and his mother orders one of each item from the à la carte menu. There is a 6% sales tax and a 15% service fee, both of which are based solely on the price of the food. What is the amount of the total bill, including the tax and service fee?

*The cost of the buffet is $15.00. The cost of one of each of the items on the à la carte menu is $1.50 + $1.75 + $1.50 + $2.00 + $1.75 + $1.50 + $1.50 = $11.50. So, the cost of their food is $15.00 + $11.50 = $26.50. The 6% sales tax adds 0.06 × 26.50 = $1.59, and the 15% service fee adds 0.15 × $26.50 = $3.975 ≈ $3.98. Therefore, the total bill is $26.50 + $1.59 + $3.98 = **$32.07**.*

Tasha is making 5 flowerpots for her mother for Mother's Day. Each flowerpot is a cylindrical can that has a diameter of 7 inches and a height of 8 inches. She fills each flowerpot 3/4 full with potting soil. What is the total number of cubic inches of potting soil she needs for the 5 flowerpots? Express your answer to the nearest whole number.

*The formula for the volume of a cylinder is $V = \pi r^2 h$. Substituting what we know, we can find the volume of a single flowerpot to be $V = \pi(7/2)^2(8) = 98\pi$ in^3. Tasha uses $(3/4)(98\pi) = 73.5\pi$ in^3 of potting soil in each pot, so for all 5 flower pots, she'll need $5(73.5\pi) = 367.5\pi \approx$ **1155** in^3 of potting soil.*

Richard is making a rectangular poster for his mother for Mother's Day. The poster is proportional to a rectangular 3-inch by 5-inch card that has the words "MOM, I LOVE YOU" written in letters that are 0.5 inches tall. The shortest side of the poster is 3 feet. What is the height in inches of each of the letters on the poster?

*Since the poster is similar to the card, the corresponding sides and letters must be proportional. The shortest side of the poster measures 3 feet, which is equivalent to 36 inches. The ratio of the height of the letters on the card to the height of the letters on the poster must be the same as the ratio of the lengths of the corresponding sides of the card and the poster. So, to find the height of each letter on the poster, we can write and solve the following proportion by cross multiplying: 0.5/x = 3/36 → 3x = 18 → x = **6** inches.*

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