

# MATHCOUNTS® Problem of the Week Archive

**Independence Day 2019 – July 1, 2019**

## ***Problems & Solutions***

Thursday is the 4th of July... here are a few problems relating to Independence Day!! While walking around at their town's Independence Day Festival, Latrease and Hannah decide to buy lunch. Latrease bought two hot dogs and a soda for a total of \$7.50. Hannah bought a hot dog, a soda, and a bag of chips for \$5.50. If a bag of chips costs \$1.00, how much does one hot dog cost?

*Let  $h$ ,  $s$  and  $c$  represent the costs of a hot dog, a soda and a bag of chips, respectively. From the problem we can set up the following equations:  $2h + s = 7.50$  and  $h + s + c = 5.50$ . We are told that a bag of chips costs one dollar, so  $c = 1$ . Substituting, we get  $h + s + 1 = 5.50$ , and  $h + s = 4.50$ . Now we can subtract the equations  $2h + s = 7.50$  and  $h + s = 4.50$  to get  $2h + s - (h + s) = 7.50 - 4.50 \rightarrow h = 3.00$ . Thus, one hot dog costs **\$3.00**.*

Frank is going to put on a fireworks show for his neighborhood. He bought 15 different fireworks to set off. If he plans to end with a specific sequence of five fireworks and he only wants to set off one firework at a time, how many distinct orders are there in which he could set off the fireworks?

*Since he has already determined a specific sequence for the last 5 fireworks, there are 10 slots within the order to be filled. Thus, there are a total of  $10! = 10(9)(8)(7)(6)(5)(4)(3)(2)(1) = \mathbf{3,628,800}$  orders in which the fireworks could be set off.*

Victoria and Hugo bought 42 cups of lemonade for the 10 guests they expected to have at their 4th of July party plus themselves. If 13 guests end up coming to the party, what is the minimum number of additional cups of lemonade that Victoria and Hugo must buy in order to have the planned amount of lemonade available to each guest and themselves? Express your answer as a decimal to the nearest tenth.

*The original amount of lemonade Victoria and Hugo wanted to have available for each person was  $42/(10 + 2) = 3.5$  cups. If three additional people showed up they would need an additional  $(3.5)(3) = \mathbf{10.5}$  cups of lemonade.*

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