

MATHCOUNTS[®] Problem of the Week Archive

What's for Lunch? – September 11, 2023

Problems & Solutions

Each week, Devin buys school lunch on Friday because the cafeteria serves pizza every Friday. Monday through Thursday, Devin brings his lunch to school. The lunch he brings always includes a peanut butter and jelly sandwich, a fruit and a drink. Devin has enough fruit and drink options to make a different lunch every day that he brings lunch for the next four weeks. If Devin has the same number of fruit options as he has drink options and he takes no days off from school, how many different fruit options does he have?

In four weeks, there are 20 school days. Devin will be eating school lunch on 4 of those days. So, he has enough fruit and drink options to make $20 - 4 = 16$ different lunches. If Devin only had one option for fruit and one option for his drink, that would be enough to make 1 unique meal. If he had two options for each, Devin could make $2 \times 2 = 4$ unique meals since each fruit option could be paired with each of the drink options (F1D1, F1D2, F2D1, F2D2). This is the Fundamental Principle of Counting, which says that if you have m distinct varieties of one item and n distinct varieties of another item, there are $m \times n$ distinct pairs consisting of one of each of the items. So, to get 16 different fruit and drink pairs, Devin must have $\sqrt{16} = 4$ different options for fruit (and 4 different options for drink).

Devin's twin brother, Kevin, doesn't eat pizza, so he brings a tuna salad sandwich, a fruit and a drink for lunch every Friday. Monday through Thursday, however, Kevin buys lunch in the school cafeteria. Kevin has twice as many fruit options as he does drink options. If Kevin has four fruit options, how many different lunches can Kevin bring to school for his Friday lunch?

Kevin has 4 fruit options. That means Kevin has $4 \div 2 = 2$ drink options. With 4 fruit options and 2 drink options, there are $2 \times 4 = 8$ different lunches that Kevin could bring to school for his Friday lunch.

Each four-week period, Devin spends a total of \$10.56 to buy pizza from the school cafeteria. Kevin pays the same amount for each meal he buys from the school cafeteria and spends a total of \$33.60 each four-week period. How much more money is spent per meal by the twin who buys the more expensive school lunch?

Each four-week period, Devin buys 4 school lunches and pays a total of \$10.56. That's $10.56 \div 4 = \$2.64$ per meal. Kevin pays a total of \$33.60 each four-week period to buy 16 school lunches. That's $33.60 \div 16 = \$2.10$ per meal. So, Devin spends $2.64 - 2.10 = \$0.54$ more per meal than Kevin.

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