

MATHCOUNTS[®] Problem of the Week Archive

Back to School – August 31, 2020

Problems & Solutions

It's a staple of American school lunches: peanut butter sandwiches (usually with jelly, too). The average American child will eat 1500 peanut butter sandwiches by the time she graduates from high school! (On average, that's one sandwich every four days.) It takes 850 peanuts to make an 18-oz jar of peanut butter, and an average sandwich has two ounces of peanut butter on it. How many peanuts will be needed to make all of the sandwiches a child will eat by graduation?

The total amount of peanut butter on 1500 sandwiches is $1500 \times 2 = 3000$ ounces. At 18 ounces a jar, that's equal to $3000 \div 18 = 166.666667$ jars. Since it takes 850 peanuts to make a jar of peanut butter, $850 \times 166.666667 = 141,666.666667 \approx \mathbf{141,667}$ peanuts are needed to make all of the sandwiches for one child.

A staple of art classes, Crayola Crayons have been around since 1903. The original boxes of Crayola contained eight different-colored crayons. The crayons were arranged in two rows of four crayons each. In how many different ways could the crayons have been arranged in the box?

Any of the crayons could be in the first spot on the top row, any of the remaining seven could be in the next spot, and so on. There are, therefore, $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 8! = \mathbf{40,320}$ ways to arrange the crayons.

There are 15 students in the 8th grade. The students are randomly placed into three different algebra classes of 5 students each. Trevor, Terry and Evan are best friends. What is the probability that all three of them will be in the same algebra class?

First, place Trevor into one of the classrooms. Next, let's place Evan. Since there are 14 possible spots for him and 4 of them are in the same class as Trevor, there is a $4/14$ chance of Evan being placed in the same class as Trevor. Finally, let's place Terry. Of the remaining 13 spots, 3 of them will be in the same class as Trevor and Evan. Hence, there is a $4/14 \times 3/13 = \mathbf{6/91}$ probability that Trevor, Evan and Terry will all be in the same algebra class.

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