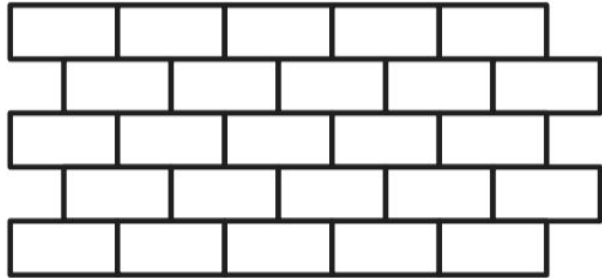


DMC February Combinatorics - Chapter/State Edition

1. A square target has side length 16 inches. In the center of the target is a smaller square with side length 4 inches. If a dart randomly hits within the larger square, what is the probability that it will land in the smaller square? Express your answer as a common fraction.
2. How many 6 letter combinations can be made from the word BANANA?
3. How many numbers less than or equal to 100 are divisible by 2 or 3 but not 4?
4. Bryan visits a carnival booth where Carl shows him 10 boxes. Exactly one of the boxes contains a gold coin; the other boxes are empty. Bryan randomly takes one of the boxes, but he doesn't open it. Carl then opens five other boxes that he knows are empty and shows Bryan that they are empty. Carl then tells Bryan he can either keep his initially chosen box or return it and choose one of the remaining closed boxes instead. If Bryan chooses to return his box and choose another one instead, what is the probability Bryan will choose the box with the gold coin? Express your answer as a common fraction.
5. Eliza creates a custom 6-sided die by randomly choosing six distinct integers from 1 to 7, inclusive, to paint onto the sides of a blank cube. She tells Philip that the faces of her die have a sum of 24. Philip rolls the die. What is the probability that Philip's die shows a prime number on the top face? Express your answer as a common fraction.
6. Jane has six different hamsters for which she has two cages, one red and one blue. She wants to put three hamsters in the red cage and three in the blue cage, but two of the hamsters, Felix and Oscar, do not get along and cannot be in the same cage. In how many different ways can she choose which three hamsters to put in the red cage?
7. In how many ways can 20 identical coins be given to 4 distinct people so that each person gets at least 2 coins?

The figure shows five rows, each containing five bricks. In how many ways can Mario choose five bricks, one in each row, so that any two bricks chosen in adjacent rows are adjacent?



The game of *Connex* contains one 4-unit piece, two identical 3-unit pieces, three identical 2-unit pieces and four identical 1-unit pieces. How many different arrangements of pieces will make a 10-unit segment? The 10-unit segments consisting of the pieces 4-3-2-1 and 1-2-3-4 are two such arrangements to include.

