

**Counting principle**

The possible number of outcomes can be found by multiplying. This counting principle states:

If event  $X$  can occur in  $x$  number of ways and is followed by event  $Y$  that can occur in  $y$  number of ways, then the event  $X$  followed by event  $Y$  can occur in  $x \cdot y$  ways.

1. If there are 12 different flavors of ice cream and 6 different ways to get the ice cream served, how many different possible choices are there?

Use the counting principle and multiply.

# of flavors  $\times$  # of ways = # of possible outcomes

$$12 \times 6 = 72$$

Thus, there are 72 different possibilities.

2. If a die is rolled three times, how many outcomes are possible?

# of outcomes the 1st roll  $\times$  # of outcomes the 2nd roll  $\times$  # of outcomes third roll

$$6 \times 6 \times 6 = \text{total \# of possible outcomes}$$

Thus, the total possible number of outcomes is 216.

Find the number of possible outcomes given each set of information.

1. John tossed three coins.
2. A die is rolled twice.
3. The Jones family had 8 different poses to choose from and 4 different frames.
4. The Oriental Palace has a special on Tuesdays—pork, chicken, or beef, with steamed or fried rice, with egg roll, fried wonton, or crab rangoon.
5. Our company's uniform comes in navy, gray, or red in four sizes: small, medium, large, and extra large.
6. A coin is tossed, and two dice are rolled.
7. A new car comes with 2 or 4 doors, 6 or 8 cylinder engine, and 6 exterior colors with 4 interior colors.
8. Caroline has 8 silver necklaces, 6 silver bracelets, and 4 pairs of silver earrings.