

# Independent Probability

## Solving Probability

You roll a 6-sided die 2 times. What is the probability that you roll a 1 and then a 2.

**MULTIPLY** the probabilities together

$$P(A \text{ and } B) = P(A) \times P(B)$$

$$\frac{1}{6} \times \frac{1}{6} = \frac{1}{36} = 2.7\%$$

## Independent vs. Dependent

### INDEPENDENT

A teacher calls on a student by drawing a popsicle stick. After the student has answered the question, **their name goes back in the cup with the rest of the students.**

### DEPENDENT

A teacher calls on a student by drawing a popsicle stick. After the student has answered the question, **their name stays out of the cup until everyone else has been called on.**

## Independent vs. Dependent

### INDEPENDENT

- pick something, then return it
- denominator stays the same with each pick
- item has the same probability of being picked each time
- There can be multiple picks as long as one item is picked at a time

**Key Words:** replaced, returned, put back

### DEPENDENT

- pick something, keep it out
- denominator decreases after each pick
- item has a better probability of being picked each time
- there can be multiple picks as long as one item is picked at a time

**Key Words:** keep it, do not return

## Example 1

A card is drawn from a deck of eight cards with letters A, B, C, D, E, F, G, and H. The card is replaced and a second card is drawn. What is the probability of getting a vowel and an F card?

$$\frac{2}{8} \times \frac{1}{8} = \frac{2}{64} = 3.1\%$$

## Example 2

What is the probability that a coin will land on heads and then land on tails?

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4} = 25\%$$

## Example 3

What is the probability of rolling a 3 on a 6-sided die and then NOT rolling a 3 on the same die?

$$\frac{1}{6} \times \frac{5}{6} = \frac{5}{36} = 13.8\%$$

## Example 4

What is the probability of drawing an Ace from a deck of cards, replacing it, and then drawing the King of Clubs?

$$\frac{4}{52} \times \frac{1}{52} = \frac{4}{2704} = .14\%$$

## Example 5

You have a bag of marbles. It contains 6 blue, 4 red, and 2 purple marbles. What is the probability of getting a blue marble, replacing it, and then a red marble?

$$\frac{6}{12} \times \frac{4}{12} = \frac{24}{144} = 16.7\%$$

## Example 6

A school survey found that 9 out of 10 students like pizza. If three students are chosen at random with replacement, what is the probability that all three students like pizza?

$$\frac{9}{10} \times \frac{9}{10} \times \frac{9}{10} = \frac{27}{100} = 27\%$$

A jar contains 6 blue, 3 red, 5 green, and 2 yellow candies.

Ex. 7: P(two red candies) if replaced.

Ex. 8: P(two greens then a red) if replaced.

Ex. 9: P(a yellow then a blue) if replaced.