

Independent Events

Independent events are events that you can do repeated trials and each trial doesn't have an effect on the outcome of the next trial.

If we were to flip a coin, each time we flip that coin the chance of it landing on heads or tails will always remain the same.

If we were to roll a die, every time we roll that die we have a $\frac{1}{6}$ chance of rolling each different number regardless of what we have already rolled.

Dependent Events

A and B are dependent events if the outcome of one affects the outcome of the other.

If you draw two cards out of a deck of 52, the probability for drawing your second card changes if you don't replace the first.

Determine if these are independent or dependent events

1) You flip a coin and then roll a fair six-sided die. The coin lands heads-up and the die shows a one.

Determine if these are independent or dependent events

2) A bag contains eight red marbles and four blue marbles. You randomly pick a marble and then pick a second marble without returning the marbles to the bag. The first marble is red and the second marble is blue.

Determine if these are independent or dependent events

3) A box of chocolates contains five milk chocolates, five dark chocolates, and five white chocolates. You randomly select and eat three chocolates. The first piece is milk chocolate, the second is dark chocolate, and the third is white chocolate

Determine if these are independent or dependent events

4) A cooler contains ten bottles of sports drink: four lemon-lime flavored, three orange flavored, and three fruit-punch flavored. Three times, you randomly grab a bottle, return the bottle to the cooler, and then mix up the bottles. The first time, you get a lemon-lime drink. The second and third times, you get fruit-punch.

Probability of Independent Events

If A and B are independent events, then the probability that both A and B occur is:

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

Find the Probability:

You flip a coin and then roll a fair six-sided die. The coin lands heads-up and the die shows an even number.

Find the Probability:

A cooler contains ten bottles of sports drink: four lemon-lime flavored, three orange flavored, and three fruit-punch flavored. Three times, you randomly grab a bottle, return the bottle to the cooler, and then mix up the bottles. The first time, you get a lemon-lime drink. The second and third times, you get fruit-punch.

Find the Probability:

A survey found that 46% of parents read to their children at least once a week. Three parents are selected at random and all three read to their children at least once a week.

Probability of Dependent Events

If Event A has happened, then the probability of B is called “conditional probability of B given A”, denoted $P(B|A)$.

B can only happen based on what happened with A.

If A and B are dependent events, then the probability that both A and B occur is:

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

You randomly select 2 cards from a standard deck of 52. The first card is a heart and the second is a club.

Find the probability if:

- a. you replace the first card before selecting the second.

- b. you do not replace the first card before selecting the second.

Find the Probability:

A basket contains five apples and seven peaches. You randomly select one piece of fruit and eat it. Then you randomly select another piece of fruit. The first piece of fruit is an apple and the second piece is a peach.

Find the Probability:

A bag contains eight red marbles and four blue marbles. You randomly pick a marble and then pick a second marble without returning the marbles to the bag. The first marble is red and the second marble is blue.

Is this a Permutation or Combination?

What are the r and n values?

Rob and Mary are planning trips to nine countries this year. There are 13 countries they would like to visit. They are deciding which countries to skip.

Is this a Permutation or Combination?

What are the r and n values?

You are setting the combination on a three-digit lock. You want to use the numbers 123 but don't care what order they are in.

Is this a Permutation or Combination?

What are the r and n values?

The student body of 10 students wants to elect a president, vice president, secretary, and treasurer

Is this a Permutation or Combination?

What are the r and n values?

A group of 25 people are going to run a race. The top 8 finishers advance to the finals.

Is this a Permutation or Combination?

What are the r and n values?

A group of 45 people are going to run a race. The top three runners earn gold, silver, and bronze medals.

Given a class of 12 girls and 10 boys.

- a. What is the probability that a committee of five, chosen at random from the class, consists of three girls and two boys?

What will be in the numerator?

What will be in the denominator?

Given a class of 12 girls and 10 boys.

- a. What is the probability that a committee of five, chosen at random from the class, consists only of girls?

What will be in the numerator?

What will be in the denominator?

The license plates in the state of Utah consist of three letters followed by three single-digit numbers. Edward's initials are EAM.

- a. What is the probability that Edward's initials will be in the correct order on his license plate?

What will be in the numerator?

What will be in the denominator?