

Probability of More than One Event

EXAMPLE

If you choose a card out of a 52-card deck, which has 36 number cards and 4 aces, and then roll a standard die (numbers 1-6), what is the probability that you will get an number card from the deck and a 4 or a 5 from the die?

1st event: Number Card

There are 36 number cards in the deck (total: 52), so the probability of a number card is: $\frac{36}{52} = \frac{36 \div 4}{52 \div 4} = \frac{9}{13}$

2nd event: 4 or 5

There are one of each number on the die (total: 6), and either a 4 or a 5 would work, the probability of a 4 or a 5 is:

$$\frac{2}{6} = \frac{2 \div 2}{6 \div 2} = \frac{1}{3}$$

To combine the two events, you must multiply the two probabilities:

$$\frac{9}{13} \times \frac{1}{3} = \frac{9}{39}$$

$$\frac{9 \div 3}{39 \div 3} = \frac{3}{13}$$

	1 st Event	×	2 nd Event
Original Fractions	<i>Ace:</i> $\frac{36}{52}$	×	<i>4 or 5:</i> $\frac{2}{6}$
Reduced Fractions	$\frac{9}{13}$	×	$\frac{1}{3}$
Combined Probability	$\frac{3}{13} = 23.1\%$		

EXAMPLE

There are 9 red shirts, 3 black shirts and 3 blue shirts in a bag. If 2 shirts are chosen at random, what is the probability of choosing 2 red shirts?

1st event: Red Shirt 1

There are 9 red shirts out of a total of 15 shirts, so the probability is: $\frac{9}{15} = \frac{9 \div 3}{15 \div 3} = \frac{3}{5}$

2nd event: Red Shirt 2

The first shirt was **not** put back, so there is 1 fewer red shirt, which means there are now 8 red shirts out of a total of 14, so the probability is: $\frac{8}{14} = \frac{8 \div 2}{14 \div 2} = \frac{4}{7}$

To combine the two events, you must multiply the two probabilities:

$$\frac{3}{5} \times \frac{4}{7} = \frac{12}{35}$$

	1 st Event	×	2 nd Event
Original Fractions	<i>Red 1:</i> $\frac{9}{15}$	×	<i>Red 2:</i> $\frac{8}{14}$
Reduced Fractions	$\frac{3}{5}$	×	$\frac{4}{7}$
Combined Probability	$\frac{12}{35} = 34.3\%$		

1. If you roll a standard die (numbers 1-6) twice what is the probability that you will get a 5 and an even number?

	1 st Event	×	2 nd Event
Original Fractions		×	
Reduced Fractions		×	
Combined Probability			

2. If you grab a shirt at random out of a closet, which has 3 T-shirts and 4 button-ups, and then randomly choose a pair of socks out of a drawer, which has 4 pairs of white socks and 2 pairs of black socks, what is the probability of choosing a T-shirt and a pair of white socks?

	1 st Event	×	2 nd Event
Original Fractions		×	
Reduced Fractions		×	
Combined Probability			

3. There are 10 freshmen, 12 juniors and 13 seniors in a classroom. If 2 students are chosen at random to carry boxes to another room, what is the probability that they will both be freshmen?

	1 st Event	×	2 nd Event
Original Fractions		×	
Reduced Fractions		×	
Combined Probability			

4. The names of 10 freshmen, 12 juniors and 13 seniors are in a jar. If 2 student names are chosen at random to win a prize, what is the probability that both prizes will be won by freshmen, given that the names are put back in the jar after each prize is awarded?

	1 st Event	×	2 nd Event
Original Fractions		×	
Reduced Fractions		×	
Combined Probability			

5. If you choose a flavor of ice cream out of 32 possible flavors, and then choose either a cup or a cone at random, what is the probability that you will get a scoop of mint chocolate chip in a cone?

	1 st Event	2 nd Event
Original Fractions		
Reduced Fractions		
Combined Probability		

6. If you choose 2 scoops of ice cream at random from 32 possible flavors, given that you must choose two different flavors, what is the probability of choosing Strawberry and Bubblegum?

	1 st Event	2 nd Event
Original Fractions		
Reduced Fractions		
Combined Probability		

7. If you choose a card at random from a 52-card deck, **put it back**, and then choose another card, what is the probability that you will choose a 9 and then choose the exact same card?

	1 st Event	2 nd Event
Original Fractions		
Reduced Fractions		
Combined Probability		

8. If you choose a card at random from a 52-card deck and then choose another card, what is the probability that you will choose a 9 and then choose the exact same card?

	1 st Event	2 nd Event
Original Fractions		
Reduced Fractions		
Combined Probability		

9. There are 5 green marbles, 8 black marbles, 3 clear marbles and 4 striped marbles in a bag. If a marble is chosen at random and **then put back** before another marble is randomly chosen, what is the probability of choosing a black and a green marble?

	1 st Event	2 nd Event
Original Fractions		
Reduced Fractions		
Combined Probability		

10. There are 5 green marbles, 8 black marbles, 3 clear marbles and 4 striped marbles in a bag. If 2 marbles are chosen at random, what is the probability of choosing a black and a green marble?

	1 st Event	2 nd Event
Original Fractions		
Reduced Fractions		
Combined Probability		

11. If you choose 2 cards out of a 52-card deck, which has 13 cards in each suit, what is the probability that you will get a heart and then a club?

	1 st Event	2 nd Event
Original Fractions		
Reduced Fractions		
Combined Probability		

12. If you choose 2 cards out of a 52-card deck, which has 13 cards in each suit, what is the probability that you will get a heart and then a club, if the first card is replaced before the second card is drawn?

	1 st Event	2 nd Event
Original Fractions		
Reduced Fractions		
Combined Probability		

Probability of More than One Event Answers

1. Combined Probability: $\frac{1}{12} = 8.3\%$	2. Combined Probability: $\frac{2}{7} = 28.6\%$	3. Combined Probability: $\frac{9}{119} = 7.6\%$
4. Combined Probability: $\frac{4}{49} = 8.2\%$	5. Combined Probability: $\frac{1}{64} = 1.6\%$	6. Combined Probability: $\frac{1}{992} = 0.1\%$
7. Combined Probability: $\frac{1}{676} = 0.1\%$	8. Combined Probability: $\frac{0}{1} = 0.0\%$	9. Combined Probability: $\frac{1}{10} = 10.0\%$
10. Combined Probability: $\frac{2}{19} = 10.5\%$	11. Combined Probability: $\frac{13}{204} = 6.4\%$	12. Combined Probability: $\frac{1}{16} = 6.3\%$