Independent and Dependent Events

Suppose 10 buttons are put in a bag. Then you draw one without looking. What is the probability that you select a white button?

\[
\text{probability of an event} = \frac{\text{number of ways the event can occur}}{\text{number of possible outcomes}}
\]

\[
P(\text{white}) = \frac{3}{10} \quad \text{number of white buttons} \quad \text{total number of buttons}
\]

Now suppose you choose a black button. Then you replace it and draw another button. What is the probability that you draw a black button twice?

\[
P(\text{black})_1 \times P(\text{black})_2 = \frac{1}{5} \times \frac{1}{5} = \frac{1}{25}
\]

Suppose you choose a button, do not replace it, and then draw another button. What is the probability that you draw two black buttons?

\[
P(\text{black})_1 \times P(\text{black})_2 = \frac{1}{5} \times \frac{4}{9} = \frac{1}{45}
\]

Refer to the ten buttons shown above to find the probability for drawing each of the following.

1. a gray-colored button
2. not a white button
3. a black or white button
4. a gray-colored, white, or black button

Refer to the ten buttons shown above to find the probability for drawing each of the following. Each button is replaced.

5. a white button twice
6. a gray-colored button twice
7. a gray-colored button, then a white button
8. a white button, then a black button

Refer to the ten buttons shown above to find the probability for drawing each of the following. Each button is not replaced.

9. a white button twice
10. a gray-colored button twice
11. a gray-colored button, then a white button
12. a white button, then a black button
Independent and Dependent Events

Determine which events are dependent and which are independent.

1. drawing 2 aces in a card game
2. rolling a pair of 3’s on two dice

3. rolling a 4 twice in two
   rolls of a die
4. tossing 3 heads in a row

5. guessing the correct number
   from 1 to 10 in the third try
6. rolling doubles three times in a
   row in a game

A bag contains 3 red marbles, 2 blue marbles, and 5 green marbles. Find the
probability of drawing each of the following. Each marble is replaced.

7. 2 red marbles in a row
8. 3 green marbles in a row

9. 2 green marbles, then a blue marble
10. 1 blue marble, then a red marble

11. a blue marble, then a red marble, then a green marble

Suppose the marbles are not replaced after a drawing.
Find the probability of drawing each of the following.

12. 2 red marbles in a row
13. 3 green marbles in a row

14. a green marble, then a red marble
15. 3 red marbles in a row

16. a green marble, then a blue marble, then a red marble

Using a standard deck of 52 cards, find the probability
of drawing each of the following without replacement.

17. 2 clubs
18. a two and a seven

19. 3 queens
20. the ace of hearts and 10 of spades