

Independent and Dependent Events NOTES

Events are **independent** events if the occurrence of one event **does not affect** the probability of the other event.

- You toss a coin once and it shows heads. You toss a coin again and it shows tails.
- You roll a five on a number cube (die), and then you roll a 6.
- You randomly draw a marble from a bag, replace it, and then randomly draw another marble from the bag.
- **Multiplication Rule for Independent Events**

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

Events are **dependent** if the occurrence of one event **affects** the probability of the other event.

- You randomly draw a name from a hat. Then without putting the first name back, you draw a second name.
- You randomly pick a card from a deck of cards, do not replace it, and then pick a second card.
- **Multiplication Rule for Dependent Events**

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

Example: A bag contains 10 beads- 2 black, 3 white, and 5 red. Beads are selected one at a time.

1. Find the probability of selecting a white bead, replacing it, and then selecting a red bead.
2. Find the probability of selecting a white bead, not replacing it, and then selecting a red bead.
3. Find the probability of selecting 2 black beads with replacement.
4. Find the probability of selecting 3 white beads without replacement.

Independent and Dependent Events

1. A bag contains 5 red, 3 green, 4 blue, and 8 yellow marbles. Find the probability of randomly selecting a green marble, and then a yellow marble if the first marble is replaced.

2. A sock drawer contains 5 pairs of each color socks: white, green and blue. What is the probability of randomly selecting a pair of blue socks, replacing it, and then randomly selecting a pair of white socks?

3. In a standard deck of cards, what is the probability of picking a diamond and then another diamond without replacement?

4. Randy has 4 pennies, 2 nickles, and 3 dimes in his pocket. If he randomly chooses 2 coins, what is the probability that they are both dimes if he doesn't replace the first one?

5. Two students are chosen at random from a class of 30. What is the probability that both you and your friend are chosen?

6. A test includes several multiple choice questions, each with 5 choices. Suppose you don't know the answers for three of these questions, so you guess. What is the probability of getting all three correct?

7. Using the letters in the state ARKANSAS. Find the probability of picking an **S** and then an **A** without replacement.

8. Using the letters in the state ARKANSAS. Find the probability of picking a **K** and then a **N** without replacement.