

CHAPTER 1 Basic Concepts

The probability that an event will not occur is equal to 1 minus the probability that the event will occur.

For example, when a die is rolled, the sample space is 1, 2, 3, 4, 5, 6. Now consider the event E of getting a number less than 3. This event consists of the outcomes 1 and 2. The probability of event E is $P(E) = \frac{2}{6} = \frac{1}{3}$. The outcomes in which E will not occur are 3, 4, 5, and 6, so the probability that event E will not occur is $\frac{4}{6} = \frac{2}{3}$. The answer can also be found by subtracting from 1, the probability that event E will occur. That is, $1 - \frac{1}{3} = \frac{2}{3}$.

If an event E consists of certain outcomes, then event $\bar{E}$ (E bar) is called the **complement** of event E and consists of the outcomes in the sample space which are not outcomes of event E . In the previous situation, the outcomes in E are 1 and 2. Therefore, the outcomes in $\bar{E}$ are 3, 4, 5, and 6. Now rule five can be stated mathematically as

$$P(\bar{E}) = 1 - P(E).$$

EXAMPLE: If the chance of rain is 0.60 (60%), find the probability that it won't rain.

SOLUTION:

Since $P(E) = 0.60$ and $P(\bar{E}) = 1 - P(E)$, the probability that it won't rain is $1 - 0.60 = 0.40$ or 40%. Hence the probability that it won't rain is 40%.

PRACTICE

1. A box contains a \$1 bill, a \$2 bill, a \$5 bill, a \$10 bill, and a \$20 bill. A person selects a bill at random. Find each probability:
 - a. The bill selected is a \$10 bill.
 - b. The denomination of the bill selected is more than \$2.
 - c. The bill selected is a \$50 bill.
 - d. The bill selected is of an odd denomination.
 - e. The denomination of the bill is divisible by 5.

Basic Concepts

2. A single die is rolled. Find each probability:
 - a. The number shown on the face is a 2.
 - b. The number shown on the face is greater than 2.
 - c. The number shown on the face is less than 1.
 - d. The number shown on the face is odd.
3. A spinner for a child's game has the numbers 1 through 9 evenly spaced. If a child spins, find each probability:
 - a. The number is divisible by 3.
 - b. The number is greater than 7.
 - c. The number is an even number.
4. Two coins are tossed. Find each probability:
 - a. Getting two tails.
 - b. Getting at least one head.
 - c. Getting two heads.
5. The cards A♥, 2♦, 3♣, 4♥, 5♠, and 6♣ are shuffled and dealt face down on a table. (Hearts and diamonds are red, and clubs and spades are black.) If a person selects one card at random, find the probability that the card is
 - a. The 4♥.
 - b. A red card.
 - c. A club.
6. A ball is selected at random from a bag containing a red ball, a blue ball, a green ball, and a white ball. Find the probability that the ball is
 - a. A blue ball.
 - b. A red or a blue ball.
 - c. A pink ball.
7. A letter is randomly selected from the word "computer." Find the probability that the letter is
 - a. A "t".
 - b. An "o" or an "m".
 - c. An "x".
 - d. A vowel.

Basic Concepts

8. On a roulette wheel there are 38 sectors. Of these sectors, 18 are red, 18 are black, and 2 are green. When the wheel is spun, find the probability that the ball will land on
 - a. Red.
 - b. Green.
9. A person has a penny, a nickel, a dime, a quarter, and a half-dollar in his pocket. If a coin is selected at random, find the probability that the coin is
 - a. A quarter.
 - b. A coin whose amount is greater than five cents.
 - c. A coin whose denomination ends in a zero.
10. Six women and three men are employed in a real estate office. If a person is selected at random to get lunch for the group, find the probability that the person is a man.