CONCEPT AND VOCABULARY CHECK

Fill in each blank so that the resulting statement is true.

1. Probability that is based on situations in which we observe how frequently an event occurs is called _____ probability.
2. The set of all possible outcomes of an experiment is called the _____ of the experiment.
3. The theoretical probability of event E, denoted by _____, is the _____ divided by the _____.
4. A standard bridge deck has _____ cards with four suits: _____ and _____ are red, and _____ and _____ are black.
5. The probability of winning a lottery with one lottery ticket is the number of ways of winning, which is precisely _____, divided by the total number of possible _____.
6. Because $P(E) + P(\text{not } E) = 1$, then $P(\text{not } E) =$ _____ and $P(E) =$ _____.
7. If it is impossible for events A and B to occur simultaneously, the events are said to be _____. For such events, $P(A \text{ or } B) =$ _____.
8. If it is possible for events A and B to occur simultaneously, then $P(A \text{ or } B) =$ _____.
9. If the occurrence of one event has no effect on the probability of another event, the events are said to be _____. For such events $P(A \text{ and } B) =$ _____.

EXERCISE SET 8.7

Practice and Application Exercises

Shown again is the table indicating the marital status of the U.S. population in 2010. Numbers in the table are expressed in millions. Use the data in the table to solve Exercises 1–10. Express probabilities as simplified fractions and as decimals rounded to the nearest hundredth.

Marital Status of the U.S. Population, Ages 15 or Older, 2010, in Millions

	Married	Never Married	Divorced	Widowed	Total
Male	65	40	10	3	118
Female	65	34	14	11	124
Total	130	74	24	14	242

If one person is randomly selected from the population described in the table, find the probability, expressed as a simplified fraction and as a decimal to the nearest hundredth, that the person

1. is divorced.
2. has never been married.
3. is female.
4. is male.
5. is a widowed male.
6. is a widowed female.
7. Among those who are divorced, find the probability of selecting a woman.
8. Among those who are divorced, find the probability of selecting a man.
9. Among men, find the probability of selecting a married person.
10. Among women, find the probability of selecting a married person.

In Exercises 11–16, a die is rolled. Find the probability of getting

11. a 4.
12. a 5.
13. an odd number.
14. a number greater than 3.
15. a number greater than 4.
16. a number greater than 7.

In Exercises 17–20, you are dealt one card from a standard 52-card deck. Find the probability of being dealt

17. a queen.
18. a diamond.
19. a picture card.
20. a card greater than 3 and less than 7.

In Exercises 21–22, a fair coin is tossed two times in succession. The sample space of equally likely outcomes is {HH, HT, TH, TT}. Find the probability of getting

21. two heads.
22. the same outcome on each toss.

In Exercises 23–24, you select a family with three children. If M represents a male child and F a female child, the sample space of equally likely outcomes is {MMM, MMF, MFM, MFF, FMM, FMF, FFM, FFF}. Find the probability of selecting a family with

23. at least one male child.

24. at least two female children.

In Exercises 25–26, a single die is rolled twice. The 36 equally likely outcomes are shown as follows:

	Second Roll					
First Roll	⚀	⚁	⚂	⚃	⚄	⚅
⚀	(1, 1)	(1, 2)	(1, 3)	(1, 4)	(1, 5)	(1, 6)
⚁	(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)	(2, 6)
⚂	(3, 1)	(3, 2)	(3, 3)	(3, 4)	(3, 5)	(3, 6)
⚃	(4, 1)	(4, 2)	(4, 3)	(4, 4)	(4, 5)	(4, 6)
⚄	(5, 1)	(5, 2)	(5, 3)	(5, 4)	(5, 5)	(5, 6)
⚅	(6, 1)	(6, 2)	(6, 3)	(6, 4)	(6, 5)	(6, 6)

Find the probability of getting

25. two numbers whose sum is 4.

26. two numbers whose sum is 6.

Mega Millions is a multi-state lottery played in most U.S. states. As of this writing, the top cash prize was $656 million, going to three lucky winners in three states. Players pick five different numbers from 1 to 56 and one number from 1 to 46. Use this information to solve Exercises 27–30. Express all probabilities as fractions.

27. A player wins the jackpot by matching all five numbers drawn from white balls (1 through 56) and matching the number on the gold Mega Ball® (1 through 46). What is the probability of winning the jackpot?

28. A player wins a minimum award of $10,000 by correctly matching four numbers drawn from white balls (1 through 56) and matching the number on the gold Mega Ball® (1 through 46). What is the probability of winning this consolation prize?

29. A player wins a minimum award of $150 by correctly matching three numbers drawn from white balls (1 through 56) and matching the number on the gold Mega Ball® (1 through 46). What is the probability of winning this consolation prize?

30. A player wins a minimum award of $10 by correctly matching two numbers drawn from white balls (1 through 56) and matching the number on the gold Mega Ball® (1 through 46). What is the probability of winning this consolation prize?

Exercises 31–32 involve a deck of 52 cards. If necessary, refer to the picture of a deck of cards, **Figure 8.12** *on page 814.*

31. A poker hand consists of five cards.

a. Find the total number of possible five-card poker hands.

b. A diamond flush is a five-card hand consisting of all diamonds. Find the number of possible diamond flushes.

c. Find the probability of being dealt a diamond flush.

32. If you are dealt 3 cards from a shuffled deck of 52 cards, find the probability that all 3 cards are picture cards.

The table shows the educational attainment of the U.S. population, ages 25 and over. Use the data in the table, expressed in millions, to solve Exercises 33–38.

Educational Attainment, in Millions, of the United States Population, Ages 25 and Over

	Less Than 4 Years High School	4 Years High School Only	Some College [Less Than 4 Years]	4 Years College [or More]	Total
Male	14	25	20	23	82
Female	15	31	24	22	92
Total	29	56	44	45	174

Source: U.S. Census Bureau

Find the probability, expressed as a simplified fraction, that a randomly selected American, age 25 or over,

33. has not completed four years (or more) of college.

34. has not completed four years of high school.

35. has completed four years of high school only or less than four years of college.

36. has completed less than four years of high school or four years of high school only.

37. has completed four years of high school only or is a man.

38. has completed four years of high school only or is a woman.

In Exercises 39–44, you are dealt one card from a 52-card deck. Find the probability that

39. you are not dealt a king.

40. you are not dealt a picture card.

41. you are dealt a 2 or a 3.

42. you are dealt a red 7 or a black 8.

43. you are dealt a 7 or a red card.

44. you are dealt a 5 or a black card.

In Exercises 45–46, it is equally probable that the pointer on the spinner shown will land on any one of the eight regions, numbered 1 through 8. If the pointer lands on a borderline, spin again.

Find the probability that the pointer will stop on

45. an odd number or a number less than 6.

46. an odd number or a number greater than 3.