12.6 EXERCISES

PRACTICE

Below is the given probability that an event will occur; find the probability that it will not occur.

1. $P(E)=\frac{2}{5}$
2. $P(E)=0.72$
3. $P(E)=\frac{4}{13}$
4. $P(E)=0.15$
5. $P(E)=\frac{2}{3}$
6. $P(E)=0.49$

Apply the formulas for the probabilities of intersection and union to the following sets and determine **a.** $P(E\cap F)$ and **b.** $P(E\cup F)$. Let $n(S)$ equal the size of the sample space.

7. $n(S)=8, E=\{2,5\}, F=\{3,7,9\}$
8. $n(S)=10, E=\{1,2,5\}, F=\{1,2,3,5\}$
9. $n(S)=5, E=\{4,B\}, F=\{3\}$
10. $n(S)=8, E=\{A\}, F=\{B,C,D,E\}$
11. $n(S)=4, E=\{1,\beta\}, F=\{\alpha,2\}$
12. $n(S)=12, E=\{A,C,g,5,n,7,8,t,L\}, F=\{n,6\}$
13. $n(S)=16, E=\{1,2,A,m,13,Y,8\}, F=\{1,9,11,m\}$
14. $n(S)=11, E=\{m,7,D,4,\theta\}, F=\{\phi,D,3,7,m,\Sigma\}$

Determine the sample space of each of the following experiments.

15. A coin is flipped four times and the result recorded after each flip.
16. A card is drawn at random from the 13 hearts.
17. A coin is flipped and a card is drawn at random from the 13 hearts.
18. A quadrant of the Cartesian plane is chosen at random.
19. A slot machine lever is pulled; there are 3 slots, each of which can hold 6 different values.
20. An individual die is rolled twice and each of the two results is recorded.
21. At a casino, a roulette wheel spins until a ball comes to rest in one of the 38 pockets.
22. A lottery drawing consists of 6 randomly drawn numbers from 1 to 20; the order of the numbers matters in this case, and repetition is possible.

APPLICATIONS

23. An ordinary die is rolled. Find the probability of rolling

a. a 3 or higher.
b. an even composite number.

24. A card is drawn from a standard 52-card deck. Find the probability of drawing

a. a face card (jack, queen, or king) in the suit of hearts.
b. anything but an ace.
c. a black (clubs or spades) card that is not a face card.

25. A coin is flipped three times. Find the probability of getting

a. Heads exactly twice.
b. the sequence Heads, Tails, Heads.
c. two or more Heads.

26. A state lottery game is won by choosing the same six numbers (without repetition) as those selected by a mechanical device. The numbers are picked from the set $\{1,2,\ldots,49\}$, and the order of the numbers chosen is immaterial. What is the probability of winning?

27. What is the probability that a four-digit ATM PIN chosen at random ends in 7, 8, or 9?

28. Assume the probability of a newborn being male is one-half. What is the probability that a family with five children has exactly three boys?

29. What is the probability that a 9-digit driver's license number chosen at random will not have an 8 as a digit?

30. A roulette wheel in a casino has 38 pockets: 18 red, 18 black, and 2 green. Spinning the wheel causes a small ball to randomly drop into one of the pockets. All of the pockets are equally likely. The wheel is spun twice. Find the probability of getting

a. green both times.
b. black at least once.
c. red exactly once.

31. There is a 25% chance of rain for each of the next 2 days. What is the probability that it will rain on one of the days but not the other?

32. A pair of dice is rolled. Find the probability that the sum of the top faces is

a. seven.
b. seven or eleven.
c. an even number or a number divisible by three.
d. ten or higher.

33. A card is drawn from a standard 52-card deck. Find the probability of drawing

a. a face card or a diamond.
b. a face card but not a diamond.
c. a red face card or a king.

34. A state lottery game is won by choosing the same six numbers (without repetition) as those selected by a mechanical device. The numbers are picked from the set $\{1,2,\ldots,49\}$, and the order of the numbers chosen is immaterial. What is the probability of winning if someone buys 1000 tickets? (No two tickets have the same set of six numbers.) How many tickets would have to be bought to raise the probability of winning to one-half?

35. Two cards are drawn at random from a standard 52-card deck. What is the probability of them both being aces if

a. the first card is drawn, looked at, placed back in the deck, and the deck is then shuffled before the second card is drawn?
b. the two cards are drawn at the same time?

36. What is the probability of being dealt a five-card hand (from a standard 52-card deck) that has four cards of the same rank?

37. The probability of rain today is 75%, and the probability that Bob will forget to put the top up on his convertible is 25%. What is the probability of the inside of his car getting wet?

38. What is the probability of drawing 3 face cards in a row, without replacement, from a 52-card deck?

39. Two dice are rolled, and the difference is calculated by subtracting the smaller value from the larger value. Therefore, the difference may range from 0 to 5. Find the probability of each of the following differences:

a. 0
b. 1
c. 4

40. A letter is randomly chosen from the word MISSISSIPPI. What is the probability of the letter being an S?

41. Mike works in a company of 100 employees. If this year five people in the company are going to be randomly laid off, what is the probability that Mike will get laid off?

42. A pack of M&M's contains 10 yellow, 15 green, and 20 red pieces. What is the probability of choosing a green M&M out of the pack?

43. A jar of cookies has 3 sugar cookies, 4 chocolate chip cookies, and 2 peanut butter cookies. What is the probability of randomly choosing a peanut butter cookie out of the jar?

44. A big box of crayons contains 4 different blues, 3 different reds, 5 different greens, and 2 different yellows. What is the probability of randomly choosing a yellow crayon out of the box?

45. A bag of marbles contains 3 blue marbles, 2 red marbles, and 5 orange marbles. What is the probability of randomly picking a blue marble out of the bag?

46. Every week a teacher of a class of 25 randomly chooses a student to wash the blackboards. If there are 15 girls in the class, what is the probability that the student selected will be a boy?

47. If in a raffle 135 tickets are sold, how many tickets must be purchased for an individual to have a 20% chance of winning?

48. Zach is running for student council. At Zach's school the student council is chosen randomly from all qualified candidates. If there are 42 candidates running, including Zach, and a total of three positions, what is the probability that Zach will be selected for the council?