3.12 Exercises

Concept Check

Fill-in-the-Blank. Complete each sentence using information found in this section.

1. A/An _____ diagram can be used to view possible outcomes of an experiment.
2. The set of all possible outcomes of an experiment is its _____ _____.
3. The likelihood of a particular result is the _____ of the result.
4. An activity in which the result is random is a/an _____.
5. The probability of an event is the number of outcomes in the event divided by the number of outcomes in the _____ _____.
6. The probability of an event that can never occur is _____.

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

7. The individual result of an experiment is a probability.
8. An event is some or all of the outcomes from the sample space.
9. A single result of an experiment is an outcome.
10. The probability of a tossed coin showing either heads or tails is 1.

Applications

For each experiment, draw a tree diagram illustrating the possible outcomes and list the outcomes in the sample space. See Examples 1 through 3.

1. Four marbles are in a box: one red, one white, one blue, and one purple. One ball is chosen.
2. There are three flavors of potato chips to choose from: original, BBQ, and cheddar. One flavor is chosen.
3. When ordering pizza, a crust is chosen (crispy or thick) followed by choosing a topping (cheese, pepperoni, or sausage).
4. A game is played by tossing a coin followed by spinning a spinner with three colors: yellow, blue, and orange.
5. You have two pairs of pants: jeans and khaki pants. You also have three shirts: a blue one, a green one, and a black one. How many outfits can you make?
6. A coin is tossed followed by choosing a number from 1 to 4.
7. A spinner with two colors (yellow and blue) is spun followed by rolling a die.
8. Two digits from 0 to 9 are chosen at random. The first one is even and the second one is odd.

9. A coin is tossed 4 times.

10. A spinner has three colors: blue, green, and red. The spinner is spun 3 times.

For each problem, calculate the probability described. See Examples 4 through 6.

11. A box contains 5 marbles: two red, one white, two blue. What is the probability of choosing a blue marble from the box?

12. A machine contains only 5 gumballs: three yellow, one white, one green. What is the probability of getting a yellow gumball when you put a coin in the machine?

13. Your English professor chooses students randomly to answer questions. If the class has 20 students, what is the probability that you will be selected to answer the next question?

14. There are four socks in a drawer (two black and two blue). Two socks are chosen at random. What is the probability that the chosen socks are a matching pair?

15. In a survey of 124 dentists, 93 dentists said they would recommend Healthy White brand toothpaste, 23 dentists said they would recommend Super White brand toothpaste, and 8 dentists said they would recommend Extreme White brand toothpaste. What is the probability that one of the dentists will recommend Healthy White brand toothpaste?

16. A type of candy has six flavors: cherry, strawberry, lemon, green apple, grape, and orange. You open a new bag of candy that has three of each flavor. You reach in and grab a piece of candy without looking. What is the probability that the candy you pick is lemon-flavored?

Not all experiments are easily pictured with tree diagrams. If two dice are rolled there are 36 possible outcomes and these outcomes can be represented in table form as shown here. In this table, we have illustrated the two dice in different colors, red and blue. Use this table to find the probabilities of the events described.

	1	2	3	4	5	6
1	1, 1	1, 2	1, 3	1, 4	1, 5	1, 6
2	2, 1	2, 2	2, 3	2, 4	2, 5	2, 6
3	3, 1	3, 2	3, 3	3, 4	3, 5	3, 6
4	4, 1	4, 2	4, 3	4, 4	4, 5	4, 6
5	5, 1	5, 2	5, 3	5, 4	5, 5	5, 6
6	6, 1	6, 2	6, 3	6, 4	6, 5	6, 6

17. a sum of 7

18. a sum of 6

19. a sum of 15

20. a sum of 4

21. a sum of 2

22. a sum of 8

23. neither die is even

24. at least one die is 6

A box contains four pieces of paper with the numbers 1, 2, 3, and 4 written on them. A piece of paper is drawn at random. Find the probability of each event.

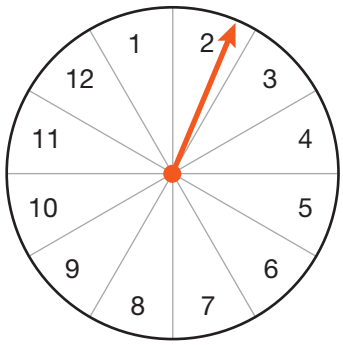
25. The number is 4.

26. The number is odd.

27. The number is less than 3.

28. The number is not 3.

A spinner (shown) with the numbers from 1 to 12 is spun once. Find the probability of each event.



29. The number is an even number.

30. The number is a prime number.

31. The number is less than 13.

32. The number is a multiple of 5.

A standard deck of cards has 52 cards with four suits (hearts, diamonds, spades, and clubs) and 13 cards in each suit. The hearts and diamonds are red cards and the spades and clubs cards are black cards. The cards are ace, king, queen, jack, 10, 9, 8, 7, 6, 5, 4, 3, and 2. If one card is drawn from the deck of cards, find the probability of each event.

33. The card is an ace.

34. The card is a 1.

35. The card is a club.

36. The card is red.

37. The card is the king of hearts.

38. The card is the 3 of diamonds.

39. The card is a queen or jack.

40. The card is 10, 9, or 8.

Writing & Thinking

41. List at least three activities that are experiments of chance.

42. Explain the benefit(s) of using a tree diagram to determine probability.

43. State the two basic characteristics of probabilities and discuss what events will have

a. a probability of 0 and **b.** a probability of 1.

44. Explain, in your own words, why the probability of an event cannot be greater than 1.