Skill Check Answers

1. a. Mutually exclusive **b.** Not mutually exclusive

8.6 EXERCISES

PRACTICE

Determine whether each situation contains independent events.

1. The color of car driven by three randomly chosen classmates.

2. A password must be six characters long with no repeated characters. Are the choices of consecutive characters independent?

3. There are 15 board members, of which seven are men and eight are women. Two randomly chosen members will serve on the United Way campaign committee. If you wish to find the probability that both members chosen are the same sex, do you treat these selections as independent events?

4. Are receiving a bill in Monday's mail and receiving a letter from your grandparents in Monday's mail independent events?

5. Naomi and Amelia both put two business cards into the basket at a coffee shop. The shop owner selects three cards from the basket. Are the two events that Naomi's card is chosen and Amelia's card is chosen independent?

APPLICATIONS

Calculate the probability of each set of mutually exclusive events. Round your answer to the nearest millionth when necessary.

6. Suppose that the probability of obtaining zero defective items in a sample of 50 items off the assembly line is 0.34 while the probability of obtaining 1 defective item in the sample is 0.46. What is the probability of the following?
a. Obtaining no more than one defective item in a sample.
b. Obtaining more than one defective item in a sample.

7. A pair of dice is rolled. What is the probability that the sum of the numbers is either 7 or 11?

8. A single letter from the word MISSISSIPPI is chosen. What is the probability of choosing an S or an I?

9. What is the probability that a card selected from a deck will be either an ace or a queen?

10. A reporter for an international newspaper is given an assignment that is randomly chosen from the following destinations worldwide: 13 continental United States assignments, 7 South American assignments, 21 European Union assignments, and 5 Asian assignments. Find the probability that he gets an assignment in Asia or South America.

11. The following table shows the breakdown of opinions for both faculty and students in a recent survey about the new restructuring of the campus to be a walking campus.

Survey Results on Restructuring Campus to a Walking Campus				
	Favor	Oppose	Neutral	**Total**
Faculty	12	4	3	**19**
Student	33	57	28	**118**
Total	**45**	**61**	**31**	**137**

a. Find the probability that a randomly selected person is either a faculty member in favor of the change or a student who has an opinion either for or against.

b. Find the probability that a randomly selected person is either neutral or in favor of the restructuring.

12. The probability of the stoplight being green at the intersection of Meeting Street and Main Street is 0.55, while the probability of it being yellow is 0.15. Find the probability that the light is red when you get to the intersection of Meeting Street and Main Street. Assume that the light will be working and will be a solid color: red, yellow, or green.

13. In a box of pens and pencils, the probability of randomly choosing a sharpened pencil is 0.54 and the probability of randomly choosing a pen from the box is 0.39. Find the probability of randomly selecting either an unsharpened pencil or a pen from the box.

Calculate the probability of each set of events that are not mutually exclusive. Round your answer to the nearest millionth when necessary.

14. A pair of dice is rolled. What is the probability that the sum of the numbers is an even number or a multiple of 3?

15. A bag of eleven marbles contains five marbles with red on them, three with green on them, seven with black on them, and four with black and red on them. What is the probability that a randomly chosen marble has either black or red on it?

16. What is the probability that a card selected from a deck will be either an ace or a spade?

17. The following is a table showing the results of a poll taken on campus.

Will You Vote in the Upcoming Election?		
	Male	**Female**
Yes	16	24
No	19	11
Not decided	21	22

a. What is the probability that a randomly selected student from this poll would be a male who has not decided whether he will vote in the upcoming election?
b. What is the probability that a randomly selected student from this poll is female or will not vote in the upcoming election?
c. What is the probability that a randomly selected student from this poll has decided to vote in the upcoming election?

18. Out of a class of 30 students, there are 16 students who study Latin, 21 who study German, and 7 who study both. What is the probability that a randomly selected student from the class will study only Latin?

19. Of the 11 instructors in the English department, four are new to the department and three are female. However, there is only one who fits all of the descriptions. Find the probability that if you randomly choose a course taught by these instructors, you get either a new instructor or a female instructor.

20. The following is a table representing the students who are on the Student Government Board.

Students on the Student Government Board		
	On-Campus Housing	**Off-Campus Housing**
Freshman	3	1
Sophomore	3	2
Junior	2	3
Senior	0	3
Graduate Student	0	2

Find the probability that a randomly chosen member of the Student Government Board is either a sophomore or lives in on-campus housing.

Calculate the probability of each set of independent events. Round your answer to the nearest millionth when necessary.

21. Suppose the probability that my pet will be alive in five years is 0.65 and the probability that my cousin's pet will be alive in five years is 0.48. Find the probability that both of these pets will be alive in five years assuming that they are independent events.

22. Two dice are thrown. Find the probability of getting an even number on the first die and an odd number on the second die.

23. Find the probability of choosing a heart and then an ace from a standard deck of cards with replacement.

24. On any given day at the beach, there is a 49% chance of precipitation. What is the probability that you will get precipitation for three days in a row on your beach vacation? Assume that the weather on a particular day at the beach is independent of the weather the day before.

Calculate each conditional probability. Round your answer to the nearest millionth when necessary.

25. A swim team consists of four boys and three girls. A relay team of four swimmers is chosen at random from the team members. What is the probability that there are two boys on the relay team given that there are two girls on the relay team?

26. Emma is playing Monopoly, a game played with two dice. What is the probability that the sum of the two dice she rolls is less than 4 given that she rolls an odd number?

27. Hunter bets his friend that he can draw two aces in a row from a standard deck of cards. What is the probability that Hunter draws a second ace given that his first card was an ace?

28. The probability that a student passes Intermediate Algebra is 0.55. The probability that a student passes College Algebra given that they pass Intermediate Algebra is 0.70. What is the probability that a student passes both College Algebra and Intermediate Algebra?

29. On each point in racquetball, a player is allowed two serves. Suppose while playing racquetball, Tim gets his first serve in about 75% of the time. He gets his first serve in and wins the point about 50% of the time. What is the probability that he wins the point, given that he gets his first serve in?

Calculate each probability. Round your answer to the nearest millionth when necessary.

30. The following table shows the student demographics for a sociology class.

Sociology 101 Student Demographics		
	Male	**Female**
Freshman	3	11
Sophomore	4	9
Junior	0	3
Senior	1	0

a. Find the probability that a randomly selected student from the class is a male.
b. Find the probability that if two students are randomly selected, without replacement, the first is a female junior and the second is a male sophomore.

31. Arianna likes chicken and apple sausage, but not chicken and asiago cheese sausage. There are 18 pieces of each kind of sausage on a sausage and cheese plate. What is the probability that Arianna randomly skewers three pieces of sausage that she likes given that the first two are to her liking?

32. A swim team consists of four boys and three girls. A relay team of four swimmers is chosen at random.
   a. What is the probability that two boys and two girls are chosen for the relay team?
   b. What is the probability that Jim is one of the two boys and Jane is one of the two girls?

33. James has 20 applications on the home screen of his smartphone. His nephew accidently deletes five of the apps on his home screen. What is the probability that the app originally in the top right corner and the app originally in the bottom left corner have not been deleted?

34. The probability that an e-mail is spam is 0.05, the probability that the word "offer" is in an e-mail is 0.02, and the probability that the word "bank" is in an e-mail is 0.1. The probability that the word "offer" appears given that the e-mail is spam is 0.2, and the probability that the word "bank" appears given that the e-mail is spam is 0.4.
   a. Find the probability that an e-mail contains the word "bank" and is spam.
   b. If the words are assumed to appear independently, find the probability that an e-mail that contains "offer" and "bank" is spam.