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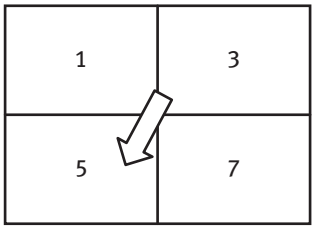
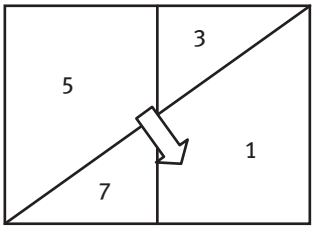
Course 2 Unit 5 Practice

LESSON 20-1



Spinner A



Spinner B

Sage and Chloe are playing a game in which the player who spins the larger number is the winner.

1. **Construct viable arguments.** Sage decides that he will choose Spinner A. Do you agree with Sage's choice? Explain why or why not.

2. Explain whether the statement below is true or false and explain your reasoning.

   The spinners shown above will land on 1 the same number of times if both spinners are spun 20 times.

3. **Make use of structure.** List the possible outcomes for the spinners above as ordered pairs with the first number being the result from Spinner A and the second number being the result from Spinner B.

4. Use the spinners to complete the following:

	Spinner B results			
	1	3	5	7
1				
3				
5				
7				

   a. Spin both spinners to play Sage and Chloe's game. Complete the table with a W if Spinner B wins, an L if Spinner A wins, or a T if both spinners show the same number.

   b. Based on the outcome of your spins, did Sage make the correct choice in Item 1? Explain why or why not.

5. **Reason abstractly.** In a new game, the person spinning the smallest number out of 5 numbers on a spinner wins.

   a. Create two spinners for this game.

   b. Explain if either of the spinners you created gives an advantage to a player and why.

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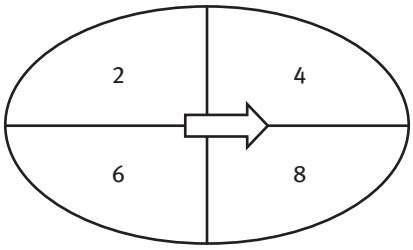
LESSON 20-2



The rules to the game are:

- The first player spins and then the second player spins.
- The second player wins if he or she lands on a number different from the number the first player spins. If he or she lands on the same number, the first player wins.

6. If your friend spins a 2, is it more likely that your spin will match your friend's spin or is it more likely that your spin will not match your friend's spin?

7. Is this a fair game? Explain your reasoning.

8. Attend to precision. Design a spinner for which:

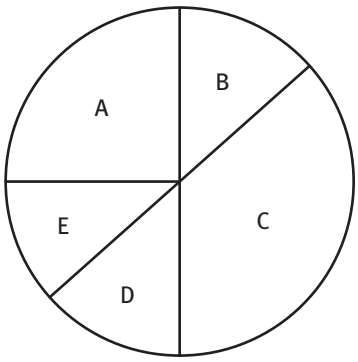
$$P(1) = \frac{1}{8}$$

$$P(3) = \frac{3}{8}$$

$$P(6) = \frac{1}{8}$$

$$P(\text{even number}) = \frac{1}{2}$$

9. Determine the probability of spinning each outcome on the spinner below.



a. P(A)

b. P(B)

c. P(C)

d. P(D)

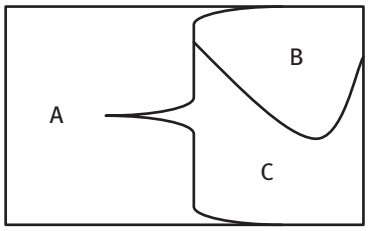
e. P(E)

10. Reason quantitatively. Determine if the following statement is true or false and explain your choice.

The probability of landing on C in the spinner in Item 9 is greater than the probability of landing on the total area of spaces A and B.

LESSON 20-3

11. Which area in the spinner below is most likely to be spun? Explain your reasoning.



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12. Reason quantitatively. Remy estimated the probability of P(A) as $\frac{1}{2}$. Tell whether this is a reasonable estimate and explain your choice.

13. These tables show the results of 12 spins of the crazy spinner in Item 11.

Spin	Result
1	A
2	C
3	A
4	B
5	C
6	B

Spin	Result
7	A
8	C
9	C
10	A
11	B
12	A

a. How many of the spins resulted in a C?

b. What fraction of the spins resulted in a C?

14. Two students spun a spinner and the following tables show their results.

Spin	Result
1	A
2	C
3	A
4	A
5	C
6	B
7	A
8	C

Spin	Result
1	B
2	A
3	C
4	A
5	C
6	A
7	B

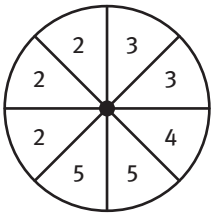
a. Based on these results, what is the estimated probability of spinning C?

b. Based on these results, what is the estimated probability of spinning A?

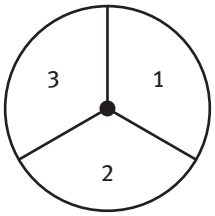
15. Critique the reasoning of others. Matson says that the estimated probability based on these combined results is more accurate than the probability determined from the results of one person. Is Matson correct? Explain why or why not.

LESSON 20-4

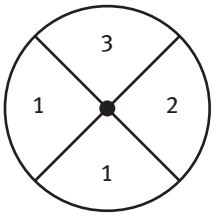
Spinner A



Spinner B



Spinner C

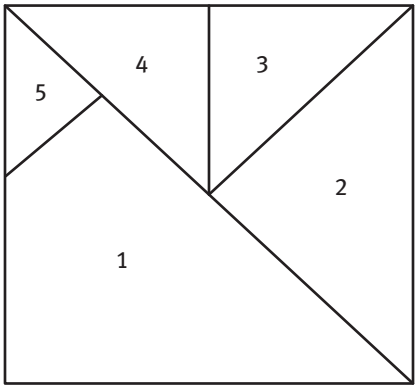


16. For which spinner above is P(3) the greatest? Explain your reasoning.

17. For which spinner above is P(2) the least? Explain your reasoning.

18. For which spinners above are P(1) and P(2) the same on the spinner?

19. Determine the following probabilities using the spinner below.



a. P(1)

b. P(2)

c. P(3)

d. P(4)

e. P(5)

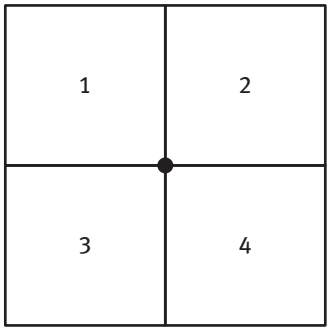
20. Reason abstractly. Which of the following sequences could have been spun using the spinner in Item 19? Explain your reasoning.

Sequence 1: 1, 1, 2, 4, 3, 4, 2, 1, 1, 2

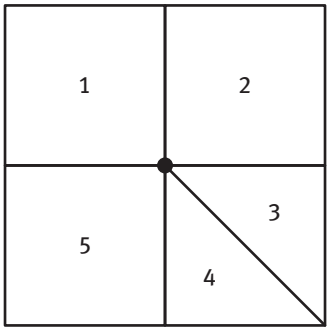
Sequence 2: 4, 4, 4, 5, 5, 3, 2, 1, 4, 5

Sequence 3: 2, 3, 4, 3, 2, 5, 4, 5, 4, 3

LESSON 21-1



Spinner A



Spinner B

21. Which spinner above shows equally likely outcomes?

22. What is the probability of each outcome on the spinner that has equally likely outcomes?

Suppose there is a bag of colored chips containing 10 red chips, 8 blue chips, and 7 green chips.

23. Make sense of problems. How many yellow chips would need to be placed into the bag so that choosing a blue and choosing a yellow result in equally likely outcomes? Explain your choice.

24. Are the probabilities of choosing a blue chip and a green chip equally likely? Explain your reasoning.

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25. Reason quantitatively. There are 100 marbles in a jar each with a number 0–100 written on it. If the number on the marble fits the description below, you earn points.

Event	Description
F	The selected number is even.
A	The selected number is greater than 80.
S	The selected number the same as your age.
T	The selected number is odd.

a. If the number of points to be earned for each event is 10, 10, 20 and 30, with the least number of points being assigned to the event with the greatest probability, then how should the points be assigned?

F_____ A_____ S_____ T_____

b. What is the probability you will earn 20 points on one turn?

LESSON 21-2

Two number cubes are rolled. The results are shown in the table below. Even number rolls are wins and odd number rolls are losses.

3	8	6	10	7	4
7	6	6	8	7	5
8	7	3	4	2	8
8	3	7	10	7	10

26. Use the results in the table to give the probability of a win as both a ratio and a decimal to the nearest hundredth.

27. Construct viable arguments. What type of probability is your answer in Item 26, estimated or theoretical? Explain your choice.

Roll two number cubes 24 times and record the results of these rolls.

28. Determine P(even) and its complement.

29. How do your results compare to the results given in the table above Item 26?

30. What type of probability are your results in Item 28, estimated or theoretical? Explain your choice.

LESSON 21-3

Use the table below to determine the following probabilities from the list of results on page 267.

Event	Description
F	Student selected is female.
I	Student selected is left-handed.
R	Student selected chose PE as favorite subject.
S	Student selected sent 0 text messages.
T	Student selected chose flying as super power.

31. P(F)

32. P(I)

33. P(R and S)

34. P(S and T)

35. P(F')

LESSON 22-1

Pascal and Audrie are playing a game in which two number cubes are rolled for each turn. If the numbers on both cubes are odd or both even, Pascal wins. If the numbers on the spins are a combination of odd and even, Audrie wins.

36. The results on their first game are shown below. Who won the game? Explain your thinking.

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

37. On what fraction of the turns did Pascal win? On what fraction of the turns did Audrie win?

38. Using the results from the table in Item 36, what is P(both rolls even)? Give your answer as both a fraction and a decimal rounded to the nearest hundredth.

39. Using the results from the table in Item 36, what is P(both rolls odd')?

40. Construct viable arguments. Is this a fair game? Explain why or why not.

LESSON 22-2

Sam, Kane, and Zane decide to add another throw to the game Rock, Paper, Scissors. They added Water that rusts the scissors but that the paper can float in and the rock sinks in.

41. Give the sample space for the game if only Sam and Zane play, written as ordered pairs.

42. Using the sample space above, determine the following probabilities:

a. P(rock wins)

b. P(tie game)

43. Play the game 15 times with a partner, and give your results written as ordered pairs.

44. Using the results of your game, give the following probabilities:

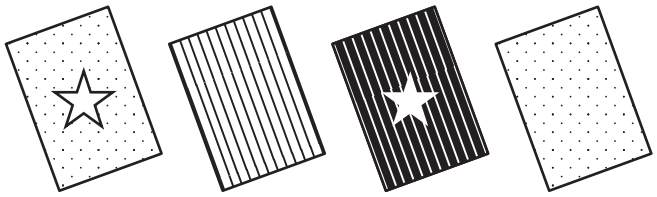
a. P(you win)

b. P(your partner wins)

c. P(tie game)

45. Persevere in solving problems. Is this a fair game? Explain why or why not.

LESSON 22-3



46. Create a tree diagram for choosing two cards from the stack of four cards shown above.

47. What is the probability of choosing a card with a star when two cards are chosen?

48. Reason quantitatively. What is the probability of choosing two cards with stripes when two cards are chosen?

49. What is the probability of choosing a card without stars when one card is chosen?

50. Make use of structure. Explain why the probability of choosing a card without a star is different from the probability of a choosing two striped cards.

LESSON 22-4

Matt picks a marble from a bag, replaces it and then chooses a second marble. There are 3 red marbles in the bag and 2 black marbles.

51. Draw a tree diagram showing the possible outcomes for Matt's marbles.

52. Write the sample space for the results on this tree diagram.

53. Make use of structure. What is the probability that Matt first chooses a black marble and then chooses a red marble?

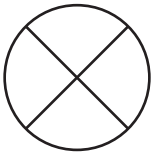
54. What is the probability that Matt chooses a red marble on both turns?

55. Construct viable arguments. Why is the probability of choosing a red marble and then a black marble higher than choosing two black marbles in a row?

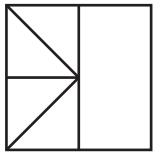
LESSON 23-1

56. Which of the following spinners could be substituted for rolling a number cube?

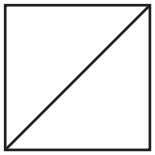
Spinner A



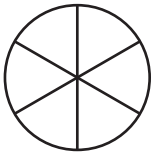
Spinner B



Spinner C



Spinner D



57. Make sense of problems. Suppose you wanted to simulate rolling a fair number cube by choosing marbles from a bag. If you already have 8 red marbles in the bag to represent the number 1 on the number cube. How many more marbles will you need?

58. If you decide to use random digits to simulate rolling a number cube, how many digits would be needed to simulate this event? Explain your choice.

59. Use random digits to simulate choosing a marble from a bag that contains five marbles, one red, one blue, one green and two yellow.

a. Explain how you would assign digits to the marbles in the bag.

b. Use this assignment of digits to complete the table below showing the color marble being drawn for each digit in the table.

Digit	7	0	0	9	6	4	8	3	5	2
Outcome										

60. Use your table to calculate the probability of choosing a red marble from the bag.

LESSON 23-2

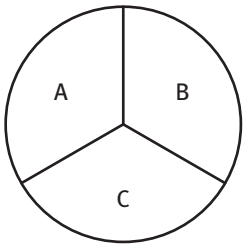
61. Use one random digit to represent a selection, with 0, 2, 4, 6 and 8 representing tossing heads on a coin and 1, 3, 4, 7, and 9 representing tossing tails on a coin. Will this assignment of digits fairly simulate the tossing of the coin?

62. Use one random digit to represent a selection, with 0, 2, and 4 representing a blue marble being chosen from a bag, 1, 3, and 9 representing a red marble being chosen from the bag, and 5, 6, and 7 representing a yellow marble being chosen from the bag. Complete the table below showing the color chosen for each digit and give the estimated probability of choosing a blue marble from the bag.

Digit	3	4	5	4	9	6	5	8	1
Color									

63. In Item 62 above, what would the digit 8 represent? Explain your choice.

64. Model with mathematics. To use random digits to simulate the results from a spinner, what assignment of digits could be made to accurately model this spinner below?



65. Groups of four random digits (0 to 9) are listed below. In a three-player game, one player wins if the sum of the four digits is less than or equal to 10, the second player wins if the sum of the four digits is between 10 and 18, and the final player wins if the sum of the four digits is greater than or equal to 18.

8836	4859	4599	6154	5846	1270
6107	7795	8358	7353	6464	9132
6946	4767	8579	3210	3128	5180
2689	4035	9499	6559	2295	1151
2147	8842				

Is this a fair game? Explain why or why not.

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LESSON 23-3

Jeremiah is playing darts and throws a dart on the red section of the board 40% of the time.

66. How could digits be assigned to simulate Jeremiah throwing darts and landing on either red or black?

67. Using the assignment of digits you created in Item 66 and row 5 of the random digit chart on page 317, determine how many of Jeremiah's darts will land on red and how many will land on black.

68. Using your simulation in Item 67 above, predict how many of Jeremiah's darts will land on red if he throws 200 darts.

69. If Jeremiah's friend Jerry throws darts that land on red 10% of the time, how could digits be assigned to indicate whether the dart lands on red or black?

70. Model with mathematics. The Seattle Seahawks ended the regular season with a 37% rate of success converting third downs. If that percentage is rounded up to the nearest ten percent, how can digits be assigned to indicate the success or failure in converting on a third down?

LESSON 23-4

A deck of cards contains the numbers 2–10, aces, and face cards. You decide to simulate choosing a card using a random digit to represent each choice. The digit 1 represents choosing an ace, the digits 2, 3, 4, 5, 6, 7 and 8 represent choosing a card with a number on it, and the digits 9 and 0 each represent a face card.

71. Reason abstractly. How many choices of cards are represented?

72. Using the assignment of digits above and row 11 of the random digit chart on page 317, determine the cards chosen from the deck. How many of the simulated picks resulted in a face card?

73. How many of the simulated picks resulted in an ace?

74. Based on this simulation, what is the estimated probability that either a face card or an ace will be chosen?

75. Based on this simulation, what is the estimated probability that a card with a number on it will be chosen?