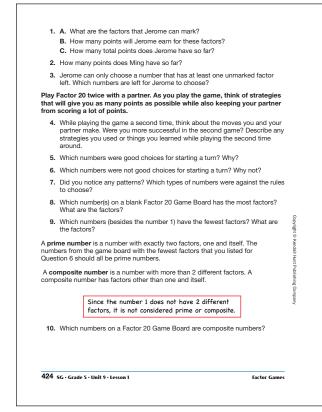
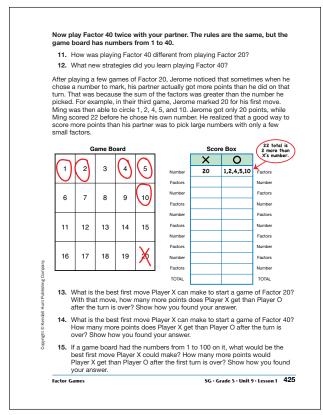
Student Guide

Factor Games (SG pp. 424–427) Questions 1–21

- **I. A.** 4, 8
 - **B.** 12
 - **C.** 26
- **2.** 26
- **3.** 6, 9, 10, 12, 15, 18, 20
- **4.** Answers will vary. Students will describe their success in the second game compared to the first.
- **5.*** Good choices are numbers that are relatively large and have only a few factors. Player X's best choice for the first turn in Factor 20 is 19, since its only factor besides itself is 1. Player O's best choice for the first turn is 15 (opponent will earn 3 + 5 = 8 points).
- **6.*** Numbers with several factors or with relatively large factors are not good choices for a starting turn. For example, 12, 18, and 20 are not good choices until some of their factors have been marked off.
- 7.* Prime numbers cannot be chosen after the first move, since a number can be chosen only if it has factors on the board. The only factor of a prime number (other than itself) is 1 and that is marked off on the first move. See the Lesson for more patterns.
- **8.*** 12, 18, and 20 each have six factors.
- **9.*** 2, 3, 5, 7, 11, 13, 17, and 19 (the prime numbers) each has only two factors.
- **10.*** 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20
- **II.** Answers will vary.
- **12.** Answers will vary.
- 13. 19, the highest prime number possible, is the best first move for Player X. After that move, Player O can circle only the number 1. So Player X gets 19 1 = 18 more points than Player O after the first turn.
- 14. 37 is the best first move for Player X in Factor 40. Player X gets 37 1 = 36 more points than Player O after the first turn.
- 15. 97 is the best first move for Player X in Factor 100. Player X earns 96 points more than Player O.



Student Guide - Page 424

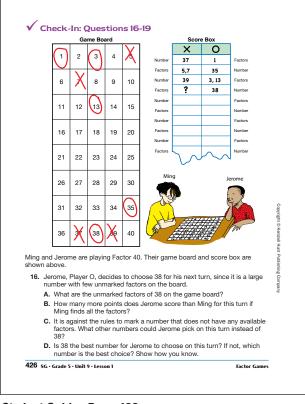


Student Guide - Page 425

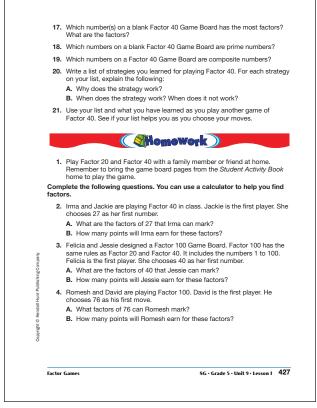
*Answers and/or discussion are included in the lesson.

I

Answer Key • Lesson 1: Factor Games



Student Guide - Page 426



Student Guide - Page 427

- **16. A.** 2, 19
 - **B.** 38 (2 + 19) = 17 more points
 - **C.** 4, 6, 8, 10, 12, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 40
 - **D.** 27 is a better choice for Jerome. Ming would earn 9 points, so Jerome would earn 27 9 = 18 more points.
- 12, 18, 20, 28, and 30 each have six factors. The factors of 12 are 1, 2, 3, 4, 6, 12; the factors of 18 are 1, 2, 3, 6, 9, 18; the factors of 20 are 1, 2, 4, 5, 10, 20; the factors of 28 are 1, 2, 4, 7, 14, 28; the factors of 30 are 1, 2, 3, 10, 15, 30.
- **18.** 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37
- **19.** 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 22, 24, 25, 26, 27, 28, 30, 32, 33, 34, 35, 36, 38, 39, 40
- **20.** Answers will vary. Strategies include:
 - The best first move for Player X is the highest prime number. Player O will earn only one point. Prime numbers cannot be chosen after the first play because their only factor, 1, has already been marked.
 - When choosing a number, think about the size of the number and the sum of its factors. Try to make the difference between the two as large as possible. Sometimes a smaller number is a better choice than a large number with a lot of factors.
 - It is usually better to choose a number that has small factors than one that has large factors. It is often best to be careful when choosing even numbers since even numbers have relatively large factors. (Half of an even number is a fairly large factor.) Since odd numbers are not divisible by two, the largest a factor of an odd number could be is one third of the number.
- **21.** No written answers required.

Γ

Homework (SG pp. 427–428) Questions 1–9 I. No written answers required. 2. A. 1, 3, 9

- **B.** 13
- **3. A.** 1, 2, 4, 5, 8, 10, 20 **B.** 50
- **4. A.** 1, 2, 4, 19, 38
 - **B.** 64
- **5. A.** Factors of 84: 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84
 - Factors of 92: 1, 2, 4, 23, 46, 92
 - **B.** 92
 - **C.** If Nicholas chooses 92, Michael can earn 1+2+4+23+46=76 points. Nicholas will earn 92-76=16 points more than Michael. If Nicholas chooses 84, Michael can earn 140 points. Michael will earn 140-84=56 points more than Nicholas.
- **6. A.** No. Edward did not mark 4, 6, 12, 18, or 36.
 - **B.** 123
- **7. A.** Factors of 31: 1, 31
 - **B.** Factors of 56: 1, 2, 4, 7, 8, 14, 28, 56
 - **C.** Factors of 63: 1, 3, 7, 9, 21, 63
 - **D.** Factors of 67: 1, 67
 - **E.** Factors of 100: 1, 2, 4, 5, 10, 20, 25, 50, 100
- **8.** 31 and 67 are prime because they have only two factors, one and themselves.
- **9.** 56, 63, 100 are composite. They each have more than two factors.

28	SG • Grade 5 • Unit 9 • Lesson 1 Factor Games
	Which of the numbers in Question 7 are prime? How do you know? Which of the numbers in Question 7 are composite? How do you know?
	 B. 56 C. 63 D. 67 E. 100
7.	 A. Did Edward mark all the possible factors of 72? If not, what other numbers could he mark? B. If Edward marks all the possible factors, how many points will he earn? List all the factors of the following numbers. A. 31
6.	C. Explain your answer. Edward and Nila are playing Factor 100. Nila is the first player. She chooses 72 as her first move. Edward marks 1, 2, 3, 8, 9, and 24. He recorded 47 points.
	wants to choose either 84 or 92 as his first move. A. Find all the factors of both 84 and 92. B. Which number is a better move for Nicholas?

Student Guide - Page 428