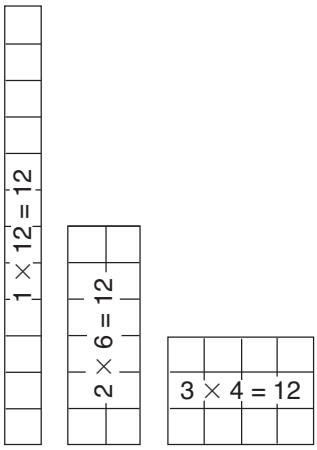
Student Guide

Questions 1–18 (SG pp. 66–69)

1.* Rectangles Possible with 12 Tiles

Number of Rows	Number in Each Row	Multiplication Sentence
2	6	2 × 6 = 12
1	12	1 × 12 = 12
3	4	3 × 4 = 12

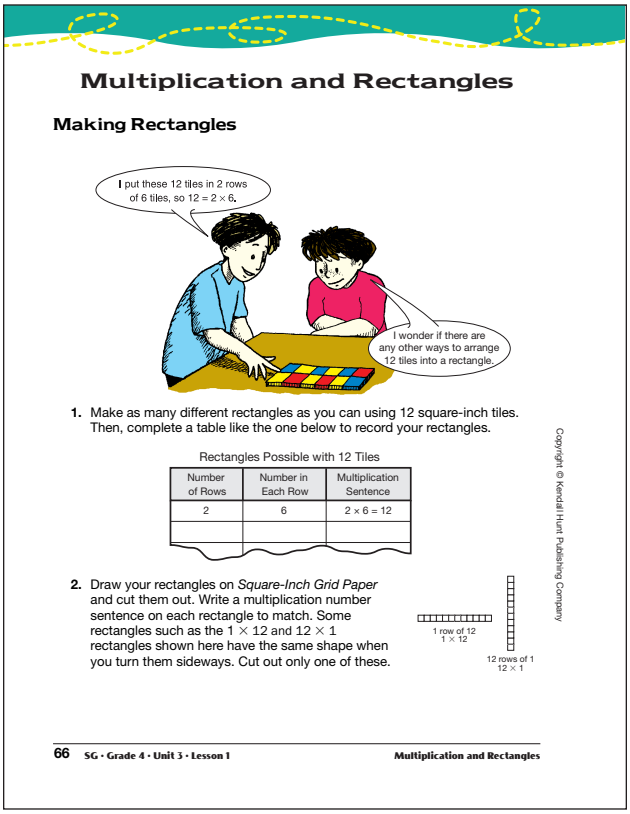
2.*



3.* Rectangles Possible with 18 Tiles

Number of Rows	Number in Each Row	Multiplication Sentence
1	18	1 × 18 = 18
2	9	2 × 9 = 18
3	6	3 × 6 = 18

4.–6.* See Figure 6 in Lesson 1 for possible rectangles for each number from 1–25.



Multiplication and Rectangles

Making Rectangles

1. Make as many different rectangles as you can using 12 square-inch tiles. Then, complete a table like the one below to record your rectangles.

Rectangles Possible with 12 Tiles

Number of Rows	Number in Each Row	Multiplication Sentence
2	6	2 × 6 = 12

2. Draw your rectangles on *Square-Inch Grid Paper* and cut them out. Write a multiplication number sentence on each rectangle to match. Some rectangles such as the 1 × 12 and 12 × 1 rectangles shown here have the same shape when you turn them sideways. Cut out only one of these.

1 row of 12
1 × 12

12 rows of 1
12 × 1

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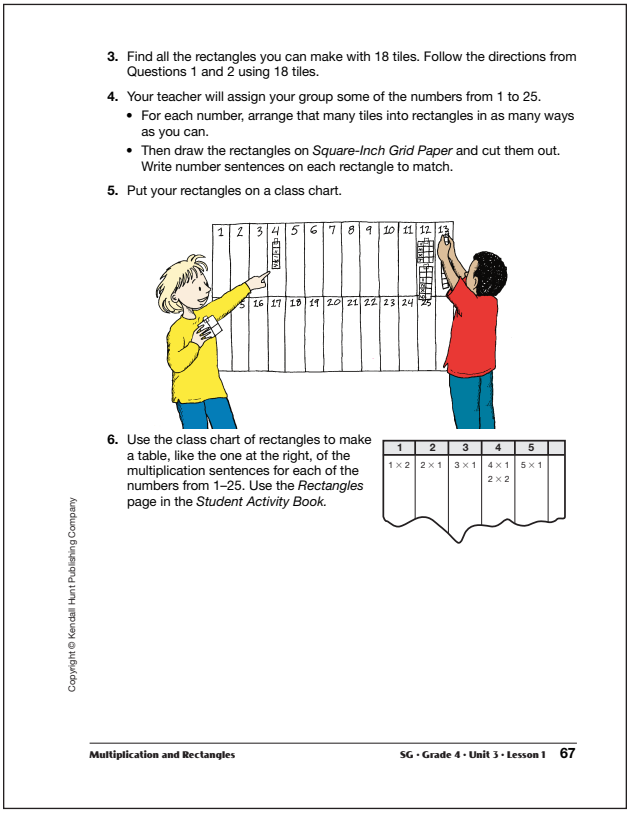

3. Find all the rectangles you can make with 18 tiles. Follow the directions from Questions 1 and 2 using 18 tiles.

4. Your teacher will assign your group some of the numbers from 1 to 25.
   - For each number, arrange that many tiles into rectangles in as many ways as you can.
   - Then draw the rectangles on *Square-Inch Grid Paper* and cut them out. Write number sentences on each rectangle to match.

5. Put your rectangles on a class chart.

6. Use the class chart of rectangles to make a table, like the one at the right, of the multiplication sentences for each of the numbers from 1–25. Use the *Rectangles* page in the *Student Activity Book*.

1	2	3	4	5
1 × 2	2 × 1	3 × 1	4 × 1 2 × 2	5 × 1

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

Multiples

Use the rectangles the class made to answer the following questions:

7. Which numbers have rectangles with 2 rows? List them from smallest to largest.

8. Which numbers have rectangles with 3 rows? List them from smallest to largest.

A number is a **multiple** of 2 if it equals 2 times another whole number. If you can make a rectangle with 2 rows for a number, then it is a multiple of 2.

Numbers that are multiples of two (2, 4, 6, 8, etc.) are called **even numbers.** Numbers that are not multiples of 2 (1, 3, 5, 7, etc.) are called **odd numbers.**

When you skip count, you say the multiples of a number. For example, skip counting by 3 gives the multiples of 3. The multiples of 3 are 3, 6, 9, 12, and so on. They are all the numbers that have rectangles with 3 rows.

9. Which numbers on the chart are multiples of 4 (have a rectangle with 4 rows)? List them from smallest to largest.

10. Which numbers on the chart are multiples of 5? List them from smallest to largest.

Prime Numbers

11. A. How many different rectangles can you make with 5 tiles?

B. How many with 7 tiles?

Numbers that are larger than one and have only one rectangle have a special name. They are called **prime numbers.** For example, 5 and 7 are prime numbers.

12. List the prime numbers between 1 and 25.

13. Are all odd numbers prime? Explain.

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7. 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

8. 3, 6, 9, 12, 15, 18, 21, 24

9. 4, 8, 12, 16, 20, 24

10. 5, 10, 15, 20, 25

11. A. Only 1 rectangle: 1×5 rectangle (5×1 rectangle is the same.)

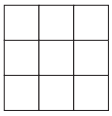
B. Only 1 rectangle: 1×7 rectangle (7×1 rectangle is the same.)

12. 2, 3, 5, 7, 11, 13, 17, 19, and 23

13. No, the numbers 9 and 15 are odd, but they are not prime numbers.

Square Numbers

The number nine is special because it has a rectangle that is a square that has three rows and three columns.



14. Which other numbers have rectangles that are squares? These numbers are called **square numbers.**

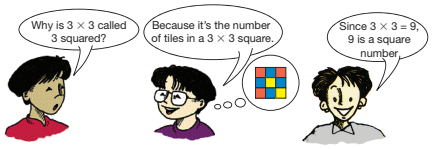
15. Find the next largest square number after 25.

16. Another way mathematicians write 3×3 is 3^2. This is read "three to the second power" or "three squared." The raised 2 is called an **exponent**. Here are some more examples:

$1^2 = 1 \times 1 = 1$
$2^2 = 2 \times 2 = 4$
$3^2 = 3 \times 3 = 9$
$4^2 = 4 \times 4 = 16$

A. What is 5^2?

B. What is 6^2?



✓ Check-In: Questions 17-18

17. A. Write the number sentences for the rectangles you can make with 30 tiles.

B. Is 30 a prime number? How do you know?

C. Is 30 a square number? How do you know?

18. A. Ming has 32 rocks in his rock collection. He wants to buy a rectangular display box with one square compartment for each rock. At the store he found boxes with 6 rows of 6 columns; 8 rows of 4 columns; 2 rows of 16 columns, and 3 rows of 10 columns. Which boxes will hold his collection with no empty compartment?

B. Show or tell how you know.

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14. 4, 16, and 25

15. 36 ($6 \times 6 = 36$)

16. A. $5 \times 5 = 25$

B. $6 \times 6 = 36$

17. A. $1 \times 30 = 30$
$2 \times 15 = 30$
$3 \times 10 = 30$
$5 \times 6 = 30$

B. No, because there is more than 1 rectangle.

C. No, because none of the rectangles are square.

18. A. Ming could use the boxes with 8 rows of 4 columns or 2 rows of 16 columns.

B. Ming has 32 rocks, $8 \times 4 = 32$ and $2 \times 16 = 32$, so he could use either of these two boxes. $6 \times 6 = 36$, so there would be 4 spaces left. $3 \times 10 = 30$, so there would not be spaces for two of his rocks.

Student Guide

Homework

Questions 1–9 (SG pp. 70–71)

1. Rectangles Possible with 20 Tiles

Number of Rows	Number in Each Row	Multiplication Sentence
1	20	1 × 20 = 20
2	10	2 × 10 = 20
4	5	4 × 5 = 20
5	4	5 × 4 = 20
10	2	10 × 2 = 20
20	1	20 × 1 = 20

2. A. Yes; Explanations will vary. 36 is a multiple of 2. A rectangle with 2 rows can be made with 36 tiles.

B. Yes; Explanations will vary. 6 × 6 = 36; A square can be made with 36 tiles—6 rows of 6 tiles each.

3. A. 2, 4, 6, 8, 10, 12, 14, 16, 18 . . . 50

B. 3, 6, 9, 12, 15, 18, 21, 24, 27 . . . 48

C. 5, 10, 15, 20, 25, 30 . . . 50

D. 6, 12, 18, 24, 30, 36, 42, 48

4. A. even

B. odd

C. odd

D. even

5. 0, 4, 6, or 8

6. A. 20, 45, 60, and 35

B. Yes; 0 or 5

7. A. 21, 12, 33, 24, 15, 36, 27, 18, 39

B. No, for each last digit, there are some numbers that are multiples of 3 and some that are not.

8. A. $2^2 = 4$

B. $5^2 = 25$

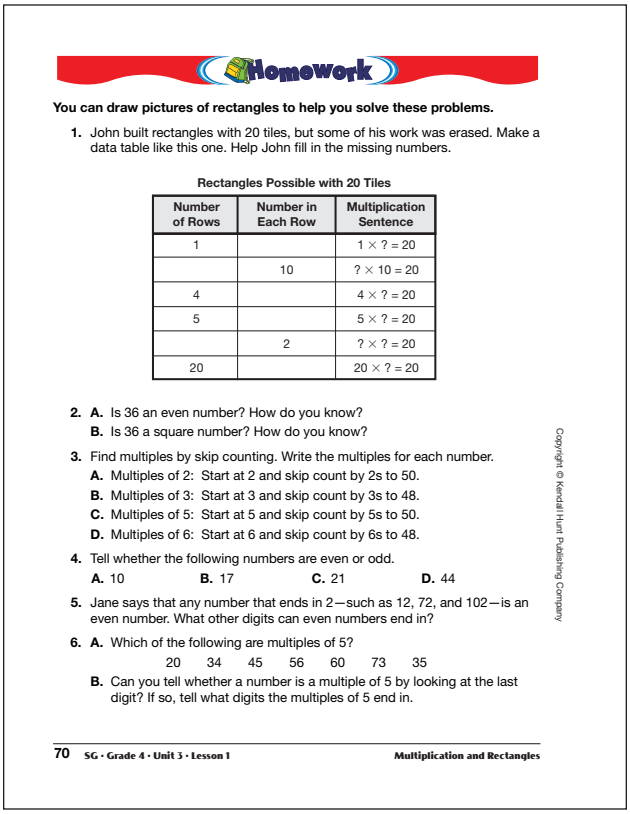
C. $7^2 = 49$

D. $10^2 = 100$

9. A. 8 × 8 = 64

B. 3 × 3 = 9

C. 9 × 9 = 81



Homework

You can draw pictures of rectangles to help you solve these problems.

1. John built rectangles with 20 tiles, but some of his work was erased. Make a data table like this one. Help John fill in the missing numbers.

Rectangles Possible with 20 Tiles

Number of Rows	Number in Each Row	Multiplication Sentence
1		1 × ? = 20
	10	? × 10 = 20
4		4 × ? = 20
5		5 × ? = 20
	2	? × ? = 20
20		20 × ? = 20

2. A. Is 36 an even number? How do you know?
B. Is 36 a square number? How do you know?

3. Find multiples by skip counting. Write the multiples for each number.
A. Multiples of 2: Start at 2 and skip count by 2s to 50.
B. Multiples of 3: Start at 3 and skip count by 3s to 48.
C. Multiples of 5: Start at 5 and skip count by 5s to 50.
D. Multiples of 6: Start at 6 and skip count by 6s to 48.

4. Tell whether the following numbers are even or odd.
A. 10 **B.** 17 **C.** 21 **D.** 44

5. Jane says that any number that ends in 2—such as 12, 72, and 102—is an even number. What other digits can even numbers end in?

6. A. Which of the following are multiples of 5?
20 34 45 56 60 73 35
B. Can you tell whether a number is a multiple of 5 by looking at the last digit? If so, tell what digits the multiples of 5 end in.

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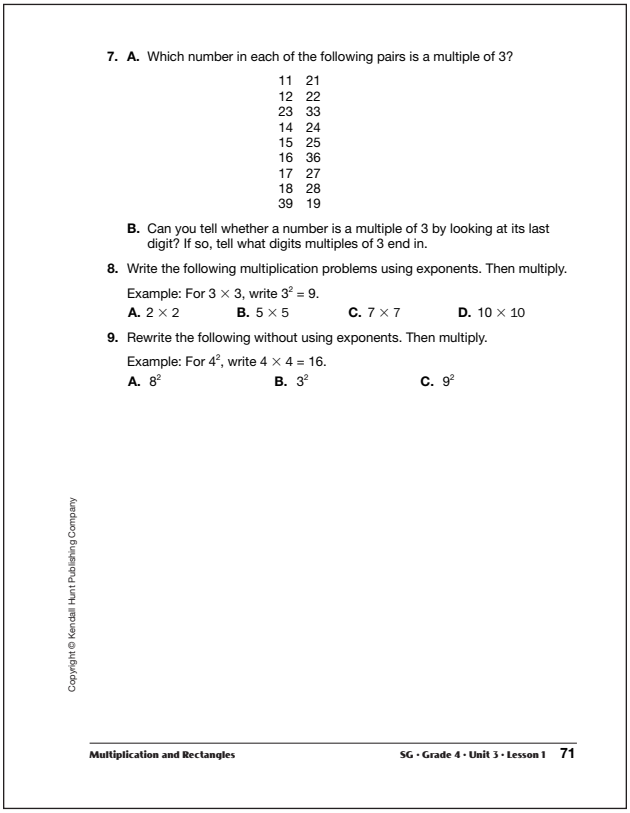

7. A. Which number in each of the following pairs is a multiple of 3?

11	21
12	22
23	33
14	24
15	25
16	36
17	27
18	28
39	19

B. Can you tell whether a number is a multiple of 3 by looking at its last digit? If so, tell what digits multiples of 3 end in.

8. Write the following multiplication problems using exponents. Then multiply.
Example: For 3 × 3, write $3^2 = 9$.
A. 2 × 2 **B.** 5 × 5 **C.** 7 × 7 **D.** 10 × 10

9. Rewrite the following without using exponents. Then multiply.
Example: For 4^2, write 4 × 4 = 16.
A. 8^2 **B.** 3^2 **C.** 9^2

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