Facts I Know: Multiplication and Division

Multiplication Facts I Know

✓ Self-Check: Questions 1–4

Multiplication Facts I Know

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

The students in Mrs. Dewey's class have been practicing their multiplication facts one group at a time using Triangle Flash Cards. They circle the facts they know and can answer quickly on their *Multiplication Facts I Know* charts. Jerome looked at his chart to see which facts he still needs to practice.

1. **A.** Which facts does Jerome still need to learn?
   B. Will knowing about turn-around facts help him learn any of these facts? If so, which ones?

Mrs. Dewey saw that Jerome still needs to learn 6 × 8. She asked the class to share strategies that will help Jerome with this fact.

Maya said, "I know 3 × 8 = 24. I just double 24 to get 6 × 8 = 48."

Luis said, "I break it apart. I know 5 × 8 = 40; 6 × 8 will be one more 8 than 40, or 48."

2. **A.** Show or tell how to use Maya's doubling strategy to find 6 × 7.
   B. Show or tell how to use Luis's break-apart strategy to find 6 × 7.

3. **A.** Look at your *Multiplication Facts I Know* chart. Make a list of the facts you need to learn.
   B. Make new Triangle Flash Cards for the facts on your list using the *Blank Triangle Flash Cards* in the *Student Activity Book*. Follow the example for 6 × 8.

4. Choose one fact from your list. Work with a partner to find a strategy that will help you remember that fact. Show or tell your strategy.

Complete the *Picturing Fact Families* page in the *Student Activity Book*.

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***Student Guide* - Page 214**

Student Guide

Questions 1–12 (SG pp. 214–218)

1. A. $4 \times 7 = 28$, $6 \times 7 = 42$, $6 \times 8 = 48$, $6 \times 9 = 54$, $7 \times 4 = 28$, $7 \times 6 = 42$, $7 \times 8 = 56$, $7 \times 9 = 63$, $8 \times 6 = 48$, $8 \times 7 = 56$, $8 \times 9 = 72$, $9 \times 4 = 36$, $9 \times 6 = 54$, $9 \times 7 = 63$, $9 \times 8 = 72$

B. Yes. Since Jerome already knows $4 \times 9 = 36$, he can use a turn-around fact to help him learn $9 \times 4 = 36$.

2. A. I know $3 \times 7 = 21$; $21 \times 2 = 42$

B. I know $6 \times 6 = 36$; $36 + 7 = 42$

3. A–B. Answers will vary.

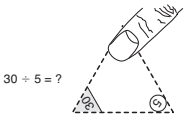
4. Answers will vary. Possible response for $6 \times 8 = 48$: I used a double strategy. I know $3 \times 8 = 24$ and $2 \times 24 = 48$, so $6 \times 8 = 48$

5–6.* See Practice Division Facts with Triangle Flash Cards Section of the lesson.

Division Facts and Triangle Flash Cards

✓ Self-Check: Question 5

5. Work with a partner. Use the *Triangle Flash Cards: 5s* and *10s* to practice the division facts. Follow these directions:
   A. One partner covers the number in the square. This number will be the answer to a division problem. The answer to a division problem is called the **quotient.** The number in the circle is the **divisor.** The divisor is the number that divides the largest number on the flash card. The second person solves a division fact with the two uncovered numbers as shown below.



   B. Place each flash card in one of three piles: Facts I Know Quickly, Facts I Can Figure Out, and Facts I Need to Learn. Make a list of the facts in the last two piles so you can study them at home.
   C. Begin your *Division Facts I Know* chart. Circle the facts you know well and can answer quickly.

For example, Jacob knew 30 ÷ 5 = 6. 5 is the divisor, so Jacob circled the 30 in the row for a divisor of 5.

Division Facts I Know

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

Divisor

Recording 30 ÷ 5 = 6 as a Fact I Know Quickly.

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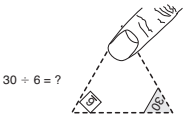
***Student Guide* - Page 215**

D. Sort the flash cards again. This time your partner covers the number in the circle. The number in the square is now the **divisor** and the covered number in the circle is the answer to the division problem, the **quotient.** If we use the same example, 6 is now the **divisor.** Jacob knew this division problem also, 30 ÷ 6 = 5, so he drew a circle around the 30 in the row for a divisor of 6 on his *Division Facts I Know* chart. He circled 30 twice on his chart.

Division Facts I Know



×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

Divisor

E. Update your *Division Facts I Know* chart each time you go through the set of Triangle Flash Cards. Circle the facts you know well and can answer quickly.
F. Discuss how you can figure out facts you do not recall right away. Share your strategies with your partner.
G. Practice the last two piles at home for homework—the facts you can figure out with a strategy and those you need to learn. Make a list of these facts.

6. As you practice the division facts and update your *Division Facts I Know* chart, compare it to your *Multiplication Facts I Know* chart.
   A. Look for facts in the same fact family.
   B. Why are there no zeros on the *Division Facts I Know* chart?

You will continue to use Triangle Flash Cards to study all the groups of division facts in the units to come. Update your *Division Facts I Know* chart each time you go through the cards. If you know one or two of the facts in a fact family, use those facts to help you learn the others.

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***Student Guide* - Page 216**

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

7. $3 \times 6 = 18$; $6 \times 3 = 18$; $18 \div 6 = 3$; $18 \div 3 = 6$; Tanya is correct.

8. $0 \div 5 = ?$ $5 \times ? = 0$

$5 \times 0 = 0$, so $0 \div 5 = 0$

9. $5 \div 0$ is undefined; there is no number that makes $0 \times \square = 5$ true.

10. A. 2, 2

B. 6, 6

C. 5, 5

D. 0, 0

E. 4, 4

F. Undefined; there is no number that makes $0 \times \square = 2$ true.

G. 6, 6

H. Undefined; there is no unique solution.

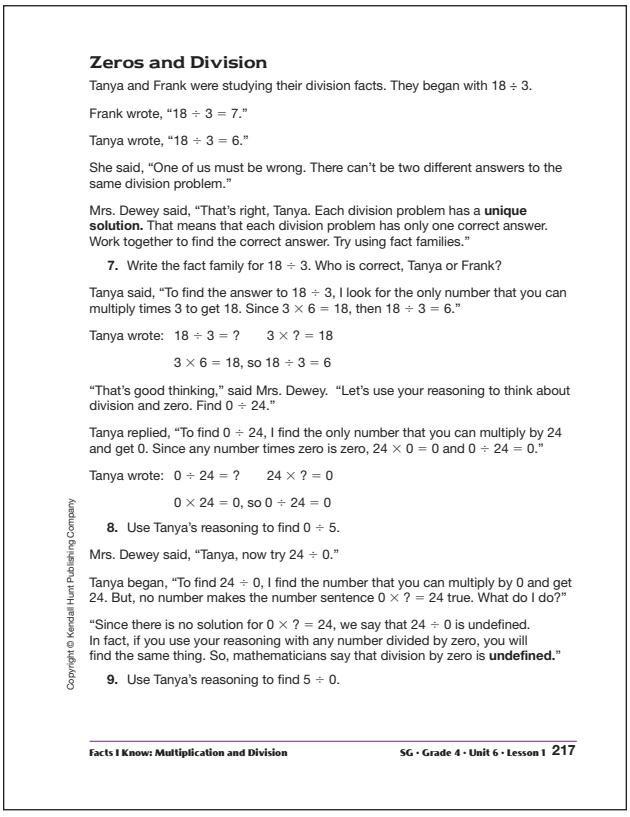
11.* Calculators will display an error message if asked to divide by zero (F and H).

12. A. 5; $7 \times 5 = 35$

B. 0; $7 \times 0 = 0$

C. Undefined; there is no number that makes $0 \times \square = 7$ true.

D. Undefined; there is no unique solution. All numbers make $\square \times 0 = 0$ true.



Zeros and Division

Tanya and Frank were studying their division facts. They began with 18 ÷ 3.

Frank wrote, "18 ÷ 3 = 7."

Tanya wrote, "18 ÷ 3 = 6."

She said, "One of us must be wrong. There can't be two different answers to the same division problem."

Mrs. Dewey said, "That's right, Tanya. Each division problem has a **unique solution.** That means that each division problem has only one correct answer. Work together to find the correct answer. Try using fact families."

7. Write the fact family for 18 ÷ 3. Who is correct, Tanya or Frank?

Tanya said, "To find the answer to 18 ÷ 3, I look for the only number that you can multiply times 3 to get 18. Since 3 × 6 = 18, then 18 ÷ 3 = 6."

Tanya wrote: 18 ÷ 3 = ? 3 × ? = 18

3 × 6 = 18, so 18 ÷ 3 = 6

"That's good thinking," said Mrs. Dewey. "Let's use your reasoning to think about division and zero. Find 0 ÷ 24."

Tanya replied, "To find 0 ÷ 24, I find the only number that you can multiply by 24 and get 0. Since any number times zero is zero, 24 × 0 = 0 and 0 ÷ 24 = 0."

Tanya wrote: 0 ÷ 24 = ? 24 × ? = 0

0 × 24 = 0, so 0 ÷ 24 = 0

8. Use Tanya's reasoning to find 0 ÷ 5.

Mrs. Dewey said, "Tanya, now try 24 ÷ 0."

Tanya began, "To find 24 ÷ 0, I find the number that you can multiply by 0 and get 24. But, no number makes the number sentence 0 × ? = 24 true. What do I do?"

"Since there is no solution for 0 × ? = 24, we say that 24 ÷ 0 is undefined. In fact, if you use your reasoning with any number divided by zero, you will find the same thing. So, mathematicians say that division by zero is **undefined.**"

9. Use Tanya's reasoning to find 5 ÷ 0.

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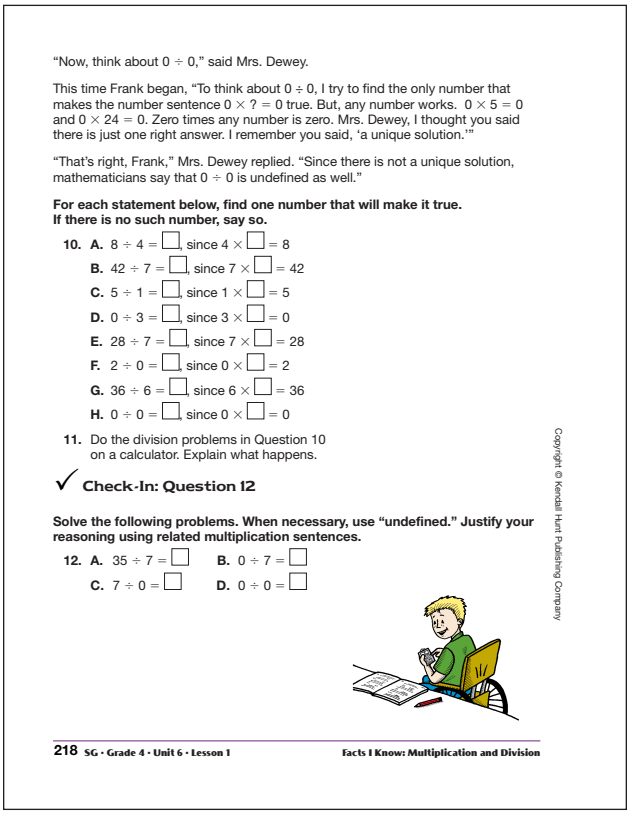
***Student Guide* - Page 217**



"Now, think about 0 ÷ 0," said Mrs. Dewey.

This time Frank began, "To think about 0 ÷ 0, I try to find the only number that makes the number sentence 0 × ? = 0 true. But, any number works. 0 × 5 = 0 and 0 × 24 = 0. Zero times any number is zero. Mrs. Dewey, I thought you said there is just one right answer. I remember you said, 'a unique solution.'"

"That's right, Frank," Mrs. Dewey replied. "Since there is not a unique solution, mathematicians say that 0 ÷ 0 is undefined as well."

For each statement below, find one number that will make it true. If there is no such number, say so.

10. A. 8 ÷ 4 = ☐, since 4 × ☐ = 8

B. 42 ÷ 7 = ☐, since 7 × ☐ = 42

C. 5 ÷ 1 = ☐, since 1 × ☐ = 5

D. 0 ÷ 3 = ☐, since 3 × ☐ = 0

E. 28 ÷ 7 = ☐, since 7 × ☐ = 28

F. 2 ÷ 0 = ☐, since 0 × ☐ = 2

G. 36 ÷ 6 = ☐, since 6 × ☐ = 36

H. 0 ÷ 0 = ☐, since 0 × ☐ = 0

11. Do the division problems in Question 10 on a calculator. Explain what happens.

✓ **Check-In: Question 12**

Solve the following problems. When necessary, use "undefined." Justify your reasoning using related multiplication sentences.

12. A. 35 ÷ 7 = ☐ **B.** 0 ÷ 7 = ☐

C. 7 ÷ 0 = ☐ **D.** 0 ÷ 0 = ☐

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***Student Guide* - Page 218**

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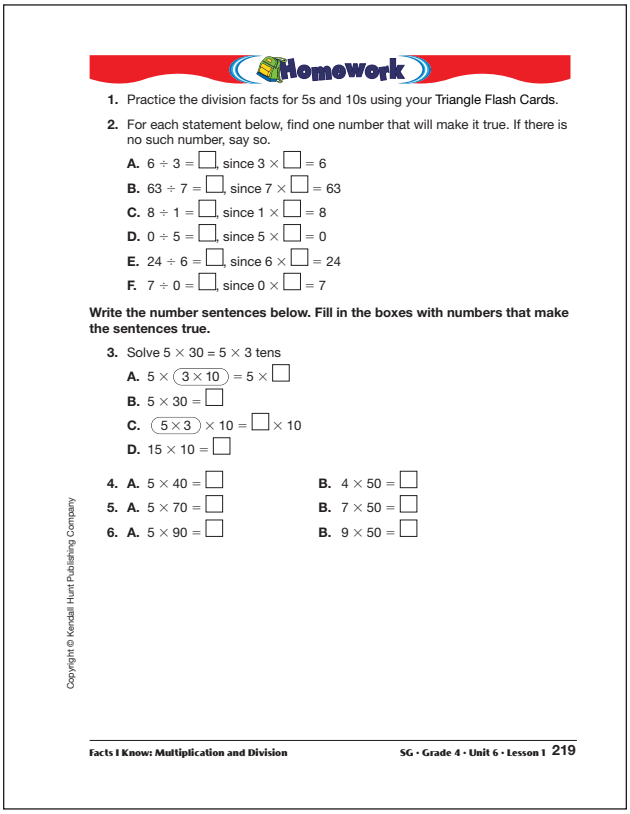
***Answers and/or discussion are included in the lesson.**



Homework

1. Practice the division facts for 5s and 10s using your Triangle Flash Cards.
2. For each statement below, find one number that will make it true. If there is no such number, say so.
   - **A.** 6 ÷ 3 = ☐, since 3 × ☐ = 6
   - **B.** 63 ÷ 7 = ☐, since 7 × ☐ = 63
   - **C.** 8 ÷ 1 = ☐, since 1 × ☐ = 8
   - **D.** 0 ÷ 5 = ☐, since 5 × ☐ = 0
   - **E.** 24 ÷ 6 = ☐, since 6 × ☐ = 24
   - **F.** 7 ÷ 0 = ☐, since 0 × ☐ = 7

Write the number sentences below. Fill in the boxes with numbers that make the sentences true.

3. Solve 5 × 30 = 5 × 3 tens
   - **A.** 5 × (3 × 10) = 5 × ☐
   - **B.** 5 × 30 = ☐
   - **C.** (5 × 3) × 10 = ☐ × 10
   - **D.** 15 × 10 = ☐
4. **A.** 5 × 40 = ☐ **B.** 4 × 50 = ☐
5. **A.** 5 × 70 = ☐ **B.** 7 × 50 = ☐
6. **A.** 5 × 90 = ☐ **B.** 9 × 50 = ☐

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Facts I Know: Multiplication and Division SG • Grade 4 • Unit 6 • Lesson 1 219

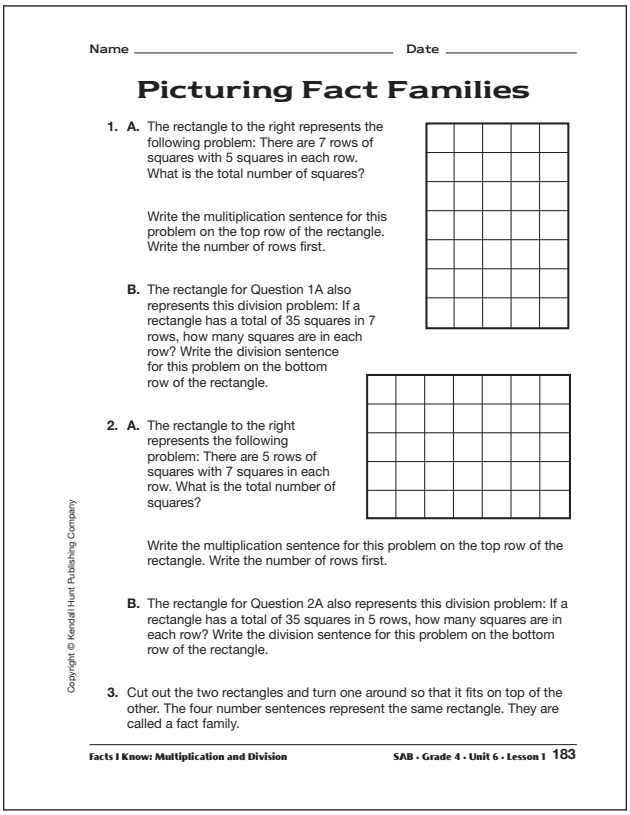
Student Guide - Page 219

Student Guide

Homework (SG p. 219)

Questions 1–6

1. Students practice at home with their *Triangle Flash Cards.*
2. **A.** 2, 2
   B. 9, 9
   C. 8, 8
   D. 0, 0
   E. 4, 4
   F. Undefined; there is no number that makes 0 × ☐ = 7 true.
3. **A.** 30
   B. 150
   C. 15
   D. 150
4. **A.** 200 **B.** 200
5. **A.** 350 **B.** 350
6. **A.** 450 **B.** 450



Name _____ Date _____

Picturing Fact Families

1. **A.** The rectangle to the right represents the following problem: There are 7 rows of squares with 5 squares in each row. What is the total number of squares?

   Write the mulitiplication sentence for this problem on the top row of the rectangle. Write the number of rows first.

   B. The rectangle for Question 1A also represents this division problem: If a rectangle has a total of 35 squares in 7 rows, how many squares are in each row? Write the division sentence for this problem on the bottom row of the rectangle.

2. **A.** The rectangle to the right represents the following problem: There are 5 rows of squares with 7 squares in each row. What is the total number of squares?

   Write the multiplication sentence for this problem on the top row of the rectangle. Write the number of rows first.

   B. The rectangle for Question 2A also represents this division problem: If a rectangle has a total of 35 squares in 5 rows, how many squares are in each row? Write the division sentence for this problem on the bottom row of the rectangle.

3. Cut out the two rectangles and turn one around so that it fits on top of the other. The four number sentences represent the same rectangle. They are called a fact family.

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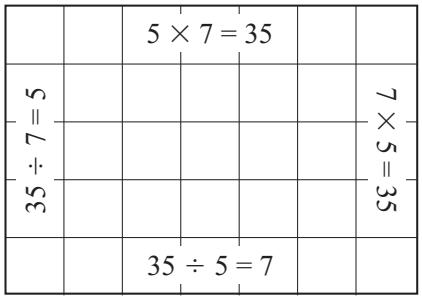
Facts I Know: Multiplication and Division SAB • Grade 4 • Unit 6 • Lesson 1 183

Student Activity Book - Page 183

Student Activity Book

Picturing Fact Families

Questions 1–3 (SAB p. 183)

1. **A.** 35 squares; 7 × 5 = 35
   B. 5 squares; 35 ÷ 7 = 5
2. **A.** 35 squares; 5 × 7 = 35
   B. 7 squares; 35 ÷ 5 = 7
3. 

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