

Facts I Know: Multiplication and Division

Multiplication Facts I Know

✓ **Self-Check: Questions 1-4**

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?

×	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

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 $3 \times 8 = 24$. I just double 24 to get $6 \times 8 = 48$."

Luis said, "I break it apart. I know $5 \times 8 = 40$; 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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Questions 1–12 (SG pp. 214–218)

- 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 $9 \times 4 = 36$.
- A.** I know $3 \times 7 = 21; 21 \times 2 = 42$

B. I know $6 \times 6 = 36; 36 + 7 = 42$
- A–B.** Answers will vary.
- 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.

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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.

$30 \div 5 = ?$

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 $30 \div 5 = 6$. 5 is the divisor, so Jacob circled the 30 in the row for a divisor of 5.

Divisor	×	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	

Recording $30 \div 5 = 6$ as a Fact I Know Quickly.

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

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, $30 \div 6 = 5$, 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.

$30 \div 6 = ?$

Divisor	×	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	

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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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.

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Zeros and Division

Tanya and Frank were studying their division facts. They began with $18 \div 3$.

Frank wrote, " $18 \div 3 = 7$."

Tanya wrote, " $18 \div 3 = 6$."

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 $18 \div 3$. Who is correct, Tanya or Frank?

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

Tanya wrote: $18 \div 3 = ?$ $3 \times ? = 18$

$3 \times 6 = 18$, so $18 \div 3 = 6$

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

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

Tanya wrote: $0 \div 24 = ?$ $24 \times ? = 0$

$0 \times 24 = 0$, so $0 \div 24 = 0$

8. Use Tanya's reasoning to find $0 \div 5$.

Mrs. Dewey said, "Tanya, now try $24 \div 0$."

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

"Since there is no solution for $0 \times ? = 24$, we say that $24 \div 0$ 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 $5 \div 0$.

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"Now, think about $0 \div 0$," said Mrs. Dewey.

This time Frank began, "To think about $0 \div 0$, I try to find the only number that makes the number sentence $0 \times ? = 0$ true. But, any number works. $0 \times 5 = 0$ and $0 \times 24 = 0$. 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 $0 \div 0$ 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. $8 \div 4 = \square$, since $4 \times \square = 8$
 B. $42 \div 7 = \square$, since $7 \times \square = 42$
 C. $5 \div 1 = \square$, since $1 \times \square = 5$
 D. $0 \div 3 = \square$, since $3 \times \square = 0$
 E. $28 \div 7 = \square$, since $7 \times \square = 28$
 F. $2 \div 0 = \square$, since $0 \times \square = 2$
 G. $36 \div 6 = \square$, since $6 \times \square = 36$
 H. $0 \div 0 = \square$, since $0 \times \square = 0$

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. $35 \div 7 = \square$ B. $0 \div 7 = \square$
 C. $7 \div 0 = \square$ D. $0 \div 0 = \square$



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

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Homework (SG p. 219)

Questions 1–6

- Students practice at home with their *Triangle Flash Cards*.
- 2, 2
 - 9, 9
 - 8, 8
 - 0, 0
 - 4, 4
 - Undefined; there is no number that makes $0 \times \square = 7$ true.
- 30
 - 150
 - 15
 - 150
- 200
 - 200
- 350
 - 350
- 450
 - 450



- Practice the division facts for 5s and 10s using your Triangle Flash Cards.
- For each statement below, find one number that will make it true. If there is no such number, say so.
 - $6 \div 3 = \square$, since $3 \times \square = 6$
 - $63 \div 7 = \square$, since $7 \times \square = 63$
 - $8 \div 1 = \square$, since $1 \times \square = 8$
 - $0 \div 5 = \square$, since $5 \times \square = 0$
 - $24 \div 6 = \square$, since $6 \times \square = 24$
 - $7 \div 0 = \square$, since $0 \times \square = 7$

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

- Solve $5 \times 30 = 5 \times 3$ tens.
 - $5 \times (\underline{3 \times 10}) = 5 \times \square$
 - $5 \times 30 = \square$
 - $(\underline{5 \times 3}) \times 10 = \square \times 10$
 - $15 \times 10 = \square$
- $5 \times 40 = \square$
 - $4 \times 50 = \square$
- $5 \times 70 = \square$
 - $7 \times 50 = \square$
- $5 \times 90 = \square$
 - $9 \times 50 = \square$

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Picturing Fact Families

Questions 1–3 (SAB p. 183)

- 35 squares; $7 \times 5 = 35$
 - 5 squares; $35 \div 7 = 5$
- 35 squares; $5 \times 7 = 35$
 - 7 squares; $35 \div 5 = 7$

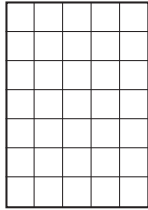
		$5 \times 7 = 35$		
$5 = 7 \div 5$				$7 \times 5 = 35$
		$35 \div 5 = 7$		

Name _____ Date _____

Picturing Fact Families

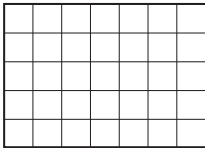
- A. The rectangle to the right represents the following problem: There are 7 rows of squares with 5 squares in each row. What is the total number of squares?

Write the multiplication 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.
- 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.
- 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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Mixed-up Tables

Questions 1–15 (SAB pp. 187–188)

1.

x	2	4	8
2	4	8	16
4	8	16	32
8	16	32	64

2.

x	1	3	9
1	1	3	9
3	3	9	27
9	9	27	81

3. Possible responses: All the products are even or multiples of 4. The products on the upper right-to-lower left diagonal are the same.
4. Possible responses: All the products are odd. The products on the upper right-to-lower left diagonal are the same.

5.

x	10	5	0
10	100	50	0
5	50	25	0
0	0	0	0

6.

x	6	5	7
6	36	30	42
5	30	25	35
7	42	35	49

7. A. Possible response: All the numbers are 0.
B. Any number times 0 is 0.
8. The square numbers are on the upper left-to-lower right diagonal.

9.

x	8	6	4
8	64	48	32
6	48	36	24
4	32	24	16

10.

x	8	6	3
8	64	48	24
6	48	36	18
3	24	18	9

11.

x	20	50	80
9	180	450	720
4	80	200	320
7	140	350	560

12.

x	7	6	4
30	210	180	120
90	630	540	360
100	700	600	400

13.

Dividend				
÷	0	10	30	
Divisor	1	0	10	30
	5	0	2	6
	10	0	1	3

14.

Dividend				
÷	40	60	80	
Divisor	1	40	60	80
	5	8	12	16
	10	4	6	8

15. Strategies will vary. Students may have used $80 \div 10 = 8$ to help them solve $80 \div 5 = 16$

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Mixed-Up Tables

Homework

Fill in these multiplication tables:

1.

x	2	4	8
2			
4		16	
8			

2.

x	1	3	9
1			
3			
9			

3. What patterns do you see in the table in Question 1?

4. What patterns do you see in the table in Question 2?

5.

x	10	5	0
10			
5			
0			

6.

x	6	5	7
6			
5			
7			

7. A. What patterns do you see in the last row and column in Question 5?
B. What happens when you multiply a number times 0?
8. Where are the square numbers in the table in Question 6?

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9.

x	8	6	4
8			
6			
4			

10.

x	8	6	3
8			
6			
3			

11.

x	20	50	80
9			
4			
7			

12.

x	7	6	4
30			
90			
100			

Fill in these division tables. Divide the dividend across the top by the divisor on the side. Write the quotient in the empty squares.

13.

Dividend			
÷	0	10	30
Divisor	1	0	
	5		2
	10		

14.

Dividend			
÷	40	60	
Divisor	1		80
	5		
	10		

15. For the division table in Question 14, what strategy did you use to find the quotients?

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