

Lesson 10: Fact Families

Lesson Objective

- Students will generate fact families, given 2 factors and a product.

Instructional Materials

Material	Quantity	Description
Timer	1	
How Am I Doing? graph	1 per student	
Facts Practice graph	1 per student	
Colored pencils	1 per student	
Display Masters	1 each	<ul style="list-style-type: none">• Preview: Key Idea: Fact Families• Demonstrate: Completed Multiplication Table
Handouts	1 per student	<ul style="list-style-type: none">• Timed Fact Practice 10• Cumulative Review• Completed Multiplication Table• Practice 1• Practice 2• Independent Practice
Answer Keys	1 each	<ul style="list-style-type: none">• Timed Fact Practice 10• Cumulative Review• Practice 1• Practice 2• Independent Practice

Timed Fact Practice

Distribute the Timed Fact Practice 10 handout of the chosen set of facts: multiplication, division, or mixed. Remember to use the same set of facts throughout the module.

Say: *When I say, "begin," you will have one minute to complete the 20 multiplication/division/mixed facts. Start with the first one, going across the rows. If you make a mistake, cross out the wrong answer and write the correct answer next to it. When I say, "stop" or the timer goes off, put your pencil down.*

Say: *Ready? Begin.*

After the timer goes off, display the Timed Fact Practice 10 Answer Key and have students use a colored pencil or marker to check their work and write the number correct on the score line on the Facts Practice Graph.

Then have students graph the number correct. Connect the new point with the previous lesson's point.

Cumulative Review

Have students answer the questions on the Cumulative Review handout. Go over the answers. Correct misconceptions. Have students use a colored pencil to make corrections as needed. Collect student papers to determine who needs additional instruction.

Preview

This lesson will build on students' conceptual knowledge of multiplication and division facts. Students will list fact families, given a basic fact. This lesson is intended to strengthen students' fact fluency.

Display and introduce through a brief explanation the key idea for this lesson:

- Given $3 \times 5 = 15$, by the commutative property of multiplication, $5 \times 3 = 15$. Since multiplication and division are inverse operations, $15 \div 5 = 3$ and $15 \div 3 = 5$. 3, 5, and 15 are a fact family.

Use the Key Idea: Fact Families  display master as needed.

Engage Prior/Informal Knowledge

To open the lesson, present activities to activate students' background knowledge related to the content to be taught in this lesson. Ask students questions such as:

- If you know that $12 \times 3 = 36$, what other multiplication fact do you know? Explain your reasoning. ($3 \times 12 = 36$ is also known because of the commutative property of multiplication.)
- What is another way to think of $36 \div 12$? (12 times what number is 36?) $36 \div 3$? (3 times what number equals 36?)

Have students work in pairs for 1 minute to list as many important ideas about multiplying and dividing whole numbers as possible.

Say: *We have learned many things about multiplying and dividing whole numbers. When I say, "Go," work with your partner to list as many important ideas as you can. You will have 1 minute. Get your paper and pencils ready! Go!*

Select a few students to share their responses.

If students cannot answer these questions, stop and explicitly teach the material.

Demonstrate

1. Review the connection among a known multiplication fact, an unknown multiplication fact, and 2 unknown division facts.

Remind students that for every known multiplication fact,

- another multiplication fact is also known because of the commutative property, and
- 2 division facts are known because division is the inverse operation of multiplication.

Example: If a student knows that $7 \times 5 = 35$, then the student also knows that $5 \times 7 = 35$ because of the commutative property. Because division is the inverse operation of multiplication, the student also knows that $35 \div 7 = 5$ and $35 \div 5 = 7$.

Say: *These mathematical equations are called a fact family. A family of facts consists of 3 numbers. 2 of the numbers are factors that when multiplied together equal the product, which is the third number.*

2. Think aloud as you generate mathematical equations, given a fact family.

Display 3, 12, and 36.

Say: *I want to write 4 mathematical equations that belong to the same family of facts. 2 will be multiplication, and 2 will be division equations.*

Say: *First, I will identify the 2 factors and the product. Which 2 factors when multiplied together are the same as the third number, the product? (3 and 12)*

Display $3 \times 12 = 36$.

Say: *$3 \times 12 = 36$. By using the commutative property of multiplication, I also know that $12 \times 3 = 36$.*

Display $12 \times 3 = 36$.

Say: *I know that $12 \times 3 = 36$ can be turned into the division problem $36 \div 3 = 12$ because multiplication and division are inverse operations.*

Display $36 \div 3 = 12$ next to $12 \times 3 = 36$.

Say: *I know that $3 \times 12 = 36$ can be turned into the division problem $36 \div 12 = 3$.*

Display $36 \div 12 = 3$ next to $3 \times 12 = 36$.

Say: *These 4 math equations all belong to the same family of facts; they all use the same 3 numbers (3, 12, and 36).*

3. Repeat for additional examples such as the fact families 2, 10, and 20 as well as 4, 7, and 28.

4. Think aloud as you demonstrate how to find the fact family for a product.

Display the Completed Multiplication Table  display master.

Say: *First, I will find the product 27.*

Draw attention to 27 on the multiplication table.

Say: *What are the factors of 27 on this multiplication table? The factors of 27 are 3 and 9.*

Track to the initial rows and columns as you locate and draw attention to the factors 3 and 9.

Say: *What is the family of facts for 3, 9, and 27?*

Display 3, 9, and 27.

Say: *3 times 9 equals 27. 9 times 3 equals 27.*

**TEACHER NOTE**

Demonstrate an example that has more than 2 factor choices, such as 20 with factors of 2, 4, 5, and 10. Teach students that there are multiple fact families for 20. Demonstrate the family of facts for 2, 10, and 20 in addition to 4, 5, and 20. Emphasize that there are only 3 numbers in any family of facts.

Display $3 \times 9 = 27$.

Display $9 \times 3 = 27$.

Say: *Now, let's explore the inverse operations. Multiplication and division are inverse operations. 27 divided by 9 equals 3. 27 divided by 3 equals 9.*

Display $27 \div 9 = 3$ next to $3 \times 9 = 27$.

Display $27 \div 3 = 9$ next to $9 \times 3 = 27$.

5. Repeat for additional examples, such as the products 14 and 20.



Practice

**WATCH FOR**

Some students may confuse fact families with the set of a number and all its factors (12: 1, 2, 3, 4, 6, 12). Teach students that a family of facts consists of 3 numbers, 2 of which are the factors that when multiplied equal the product.

**WATCH FOR**

Some students may believe a family of facts consists of any 2 factors of a product and the product. Emphasize that the equation constructed with these numbers must be true. For example, if students offer 5, 10, and 20, ask what the equation is ($5 \times 10 = 20$) and whether it is true or false.

For each practice activity, provide detailed feedback to students, highlighting what was done correctly and what needs improvement. Provide opportunities for students to correct their errors. Collect student work to review and monitor student progress.

Activity 1: Help students complete the activity on the Practice 1 handout. Students may use their completed multiplication table as needed.

Activity 2: Have students work in pairs to complete the activity on the Practice 2 handout. Students may use their completed multiplication table as needed.

Independent Practice

1. Have students independently use their completed multiplication table (if needed) to complete the activity on the Independent Practice handout.
2. Go over the answers (students self-check and correct, using a colored pencil).
3. Have students record the number correct in the box and complete their How Am I Doing? graph.
4. Collect the papers to review and monitor student progress. Review the key idea. Have students provide examples from the lesson.

Closure

Have students discuss their answer to the following questions.

- Describe a fact family in your own words. Be sure to explain the relationships that exist in a fact family.
- If you know $2 \times 9 = 18$, what other multiplication and division facts do you know?

Clear up any misconceptions. Students who confuse fact families with the set of a number and all of its factors and who generate a fact family consisting of 2 factors and a product that do not correspond need additional instruction to understand why this relationship works.