InsightMath

Exploring Division of Fractions

Family Guide | Grade 5 | Unit 7

Your student is exploring how using multiplication and flexible division interpretations helps to divide with fractions.

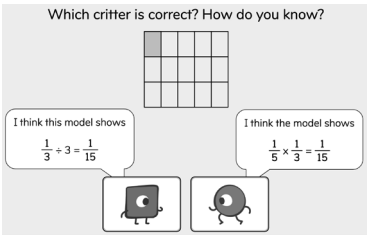
Key Math Ideas

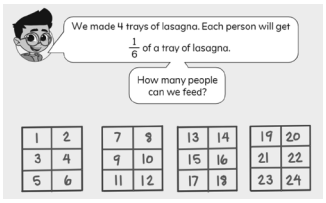
In this unit, students build on what they already know about multiplying fractions to dividing unit fractions by whole numbers and whole numbers by fractions. They connect to familiar ways of thinking about division that they used with whole numbers and recognize whether they are finding the size of each part or the number of parts. Students also make an exciting discovery that often surprises them—when you divide a whole number by a unit fraction (such as $\frac{1}{2}$ or $\frac{1}{4}$), the quotient is actually greater than the number you started with! This is different from what they are used to with whole numbers, where division typically makes numbers smaller.

Throughout their learning, students see how multiplication and division with fractions are connected. They notice that many real-world problems can be solved using either operation, depending on how you think about the situation. This helps them become more flexible in their math thinking and builds a deeper understanding of fractions in everyday life.

→ In the beginning of the unit, your student will learn to

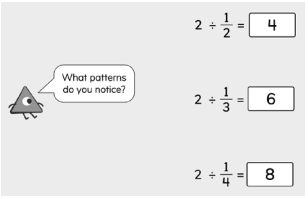
- describe division as finding the number of equally-sized parts or the size of each part;
- divide a unit fraction by a whole number using visual models and by recognizing patterns;
- interpret dividing a unit fraction by a whole number as finding the size of each equal part, such as recognizing that $\frac{1}{4} \div 2$ asks, "How much is one-fourth partitioned into two parts?"
- make connections between fraction division and multiplication such as recognizing that $\frac{1}{4} \div 2$ is equivalent to $\frac{1}{4} \times \frac{1}{2}$ and to dividing the denominator by the whole number;
- describe that the size of the quotient decreases as unit fractions are divided by whole numbers.





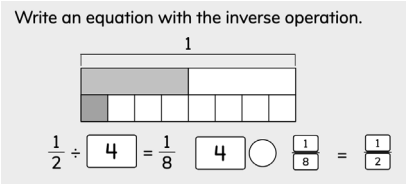
→ In the middle of the unit, your student will learn to

- divide a whole number by a unit fraction using visual models and by recognizing patterns;
- interpret dividing a whole number by a unit fraction as finding the number of equal parts of a given size, such as recognizing that $2 \div \frac{1}{4}$ asks, "How many fourths are in two wholes?";
- explain that a whole number divided by a unit fraction is equivalent to multiplying the dividend by a whole number, such as $2 \div \frac{1}{4} = 2 \times 4$;
- describe that the size of the quotient increases as whole numbers are divided by unit fractions.



→ By the end of the unit, your student will learn to

- represent the same situation involving fractions with multiplication and division;
- explain and use inverse relationship between multiplication and division when writing equations, for example, if $\frac{1}{2} \div 4 = \frac{1}{8}$, then $\frac{1}{2} = 4 \times \frac{1}{8}$;
- solve multistep word problems involving fractions using all four operations.



Helpful Hint

Until now, students' experiences with division have resulted in answers (quotients) that were less than the number they started with (the dividend). However, in this unit they start to explore situations where the answer to division is greater than the dividend. This shift in perspective and understanding is an exciting moment for students because their idea of division is expanding, which they will return to when the divide decimals as well. To support their understanding, discuss why dividing something that is already less than one into equal parts makes each part even smaller.

Tips for Supporting Your Student at Home

Questions to Ask Your Student

→ In the beginning of the unit:

- Are you finding the number of parts or the size of each part? How do you know?
- How can you divide the unit fraction ___ by the whole number ___?
- How is dividing a unit fraction by a whole number related to multiplication?

→ In the middle of the unit:

- How can you divide the whole number ___ by the unit fraction ___?
- How is dividing a whole number by a unit fraction related to multiplication?

→ By the end of the unit:

- How can the situation be represented by both a multiplication and a division equation?
- How can a visual model help you understand the inverse relationship between multiplication and division?
- How can you use what you know about adding, subtracting, multiplying and dividing fractions to solve a real world problem?

If...	Try...
your student does not know what operation to use when solving word problems involving fractions . . .	asking your student questions to help them make sense of the problem. Some examples include: "What are you starting with?" "What happens in the problem?" or "Do you need to make or join equal groups?"

Student Strengths Spotlight

I value mistakes.	Exploring new ideas can lead to mistakes, and students take this opportunity to recognize that every mistake is an opportunity to learn.
I do not give up, even when a problem is challenging.	Perseverance is important for young mathematicians, allowing students to build skills and confidence.
I make a plan to solve a problem and adapt my plan if I need to.	Students need to determine whether to add, subtract, multiply, or divide with fractions in this unit. Making a plan but adapting if needed helps them to strengthen their understanding of and ability to work with operations with fractions.
I notice patterns and try to apply them.	Noticing patterns when dividing whole numbers and unit fractions help students find efficient strategies and think flexibly to apply what they know to new problems.

Try This Together!

- **Cutting Sections.** When working with a length of something, such as ribbon, string, or wood, pose some fraction division problems like those below:
  - » Starting with a unit fraction length: Ask, "How long will each section be if you cut it into 4 sections? 7 sections? 12 sections?" Your student should recognize that the unit fraction will be divided by the whole number and result in length that is also a unit fraction, such as $\frac{1}{3} \div 4 = \frac{1}{12}$.
  - » Starting with a whole number length: Ask, "How many sections will you have if you cut the string into parts that are $\frac{1}{2}$ ft? $\frac{1}{4}$ foot?" Your student should recognize that the whole number will be divided by the unit fraction and result in a whole number amount of sections (equal parts), such as $2 \div \frac{1}{4} = 8$.
- **Share Leftovers:** The next time you have leftovers, ask your students how they would share them. For example, if $\frac{1}{4}$ of a pan of lasagna is shared between four people, how much of the whole pan would each person get? Or, if they have five cookies and each person will get $\frac{1}{2}$ of a cookie, how many people can they give an equal amount to?
- **Fraction Operations in the Real World.** Support your student to notice opportunities in the world around them that require adding, subtracting, multiplying, or dividing fractions. Ask your student which operation they would use and have them explain how they know.