InsightMath California

Extending Division of Fractions

Family Guide | Grade 6 | Unit 6

Your student is exploring how division can be performed by multiplying due to the inverse relationship between multiplication and division.

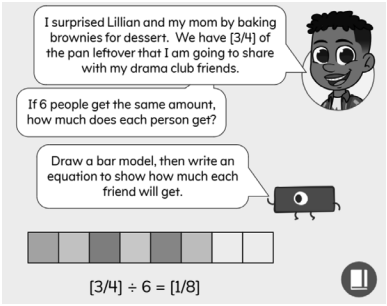
Key Math Ideas

In Grade 5, your student learned to divide a unit fraction by a whole number (such as $\frac{1}{4} \div 5$) and a whole number by a unit fraction (such as $6 \div \frac{1}{3}$). They think of dividing unit fractions by whole numbers by asking "what is the size of each part?" because (in $\frac{1}{3} \div 2 = \frac{1}{6}$, for example), each third is broken up into two smaller parts. They think about dividing a whole number by a unit fraction by asking "how many equal parts can we make?" because (in $2 \div \frac{1}{3} = 6$, for example) there are six one-thirds in 2.

In this unit, your student will use and extend this understanding to division with any type of fraction, first with models and then by looking for patterns. Your student uses the inverse relationship between division and multiplication to discover that that dividing by a fraction is the same as multiplying by its reciprocal, such as solving $2 \div \frac{3}{4}$ by multiplying $2 \times \frac{4}{3}$. They recognize this as a key idea that applies to all fraction division problems.

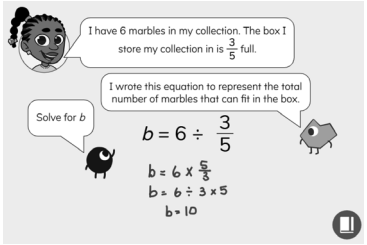
→ In the beginning of the unit, your student will learn to

- think about division with whole number divisors as asking "what is the size of each part?" such as $\frac{2}{3} \div 4$ meaning to partition $\frac{2}{3}$ into 4 equal parts;
- use bar models and equations to represent and solve division situations involving a whole number, unit fraction, or fraction divided by a whole number;
- think about division with fraction divisors as asking "how many equal parts can we make?" such as $4 \div \frac{2}{3}$ meaning to find how many groups of $\frac{2}{3}$ are in 4;
- use bar models and equations to represent and solve division situations involving a whole number divided by a fraction;



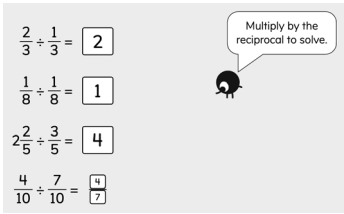
→ In the middle of the unit, your student will learn to

- use models and equations to represent multiplication and division situations involving fractions;
- divide whole numbers by fractions by multiplying by the reciprocal, such as $5 \div \frac{3}{4} = 5 \times \frac{4}{3} = \frac{20}{3}$;
- solve percentage problems by representing percentages as fractions and using strategies such as solving with inverse operations.



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

- use bar models and equations to represent multiplication and division situations involving fractions;
- divide fractions by fractions by multiplying by the reciprocal, such as
- $\frac{3}{5} \div \frac{3}{4} = \frac{3}{5} \times \frac{4}{3} = \frac{12}{15}$;
- predict when the quotient will be greater than or less than the dividend by considering whether the divisor is greater than or less than 1, such as knowing that the quotient of $4 \div \frac{2}{3}$ will be greater than 4 because $\frac{2}{3}$ is less than 1;



Helpful Hint

Throughout this unit, your student will be working with non-unit fractions (such as $\frac{2}{3}$) and mixed numbers (such as $2\frac{3}{4}$). Encourage your student to rewrite mixed numbers as fractions greater than 1, such as rewriting $1\frac{1}{2}$ as $\frac{3}{2}$ when dividing. This allows them to more efficiently multiply by the reciprocal when dividing by a fraction.

Tips for Supporting Your Student at Home

Questions to Ask Your Student

→ In the beginning of the unit:

- How can we divide fractions by whole numbers using a model?
- How can we divide whole numbers by fractions using a model?
- What equation can you write to represent the fraction division problem and model?

→ In the middle of the unit:

- When we divide by fractions, what do the quotients mean?
- Will the quotient be greater or less than what you are starting with? Why?
- How can you rewrite the division problem with multiplication to help you solve?

→ By the end of the unit:

- What does dividing by a fraction mean in this problem?
- How can you divide the fractions?

If...	Try...
your student struggles to interpret a division expression . . .	to have them reword the expression as a question. For example, instead of reading $3\frac{1}{2} \div \frac{2}{3}$ as three and one-half divided by two-thirds, rephrase it as how many groups of two-thirds are inside of three and one-half.

Student Strengths Spotlight

I take time to understand the problem and look for entry points.	Students make sense of problems before starting to solve, considering the most efficient strategies, such as using the reciprocal of the divisor.
I clarify my reasoning so others can make sense of it.	Using clear and precise language that their classmates can understand, students ensure their thinking makes sense to them and others.
I ask my classmates to clarify their reasoning, and then I explain why I agree or disagree.	Students explain why they agree or disagree while interpreting remainders in fraction division problems.
I determine what tools and strategies might help me solve this problem.	Students choose strategies to divide fractions, including using mental math when most efficient.

Try This Together!

- **Fraction Division Around Us!** Have your student help with household chores involving measuring with fractions, asking questions to get them thinking about dividing fractions by talking about how the total can be broken up into equal parts. For example, "We need $2\frac{1}{2}$ cups of rice, but I only have a $\frac{1}{2}$ cup measuring cup. How many scoops do we need?" or "This piece of wood is $3\frac{3}{4}$ feet. I need to cut it into three pieces. How long will each piece be?"
- **Play a Fraction Division Game!** Use playing cards to create fractions (face cards = 10, ace = 1) by having each player draw 4 cards to make two fractions. Each person divides their first fraction by their second fraction and explains their strategy. Ask, "Did you use the reciprocal to divide? How?" or "How can you use multiplication to help you divide?" The player with the greater quotient in that round wins all the cards. Then, pick more cards and play again!