FAMILY GUIDE

6th Grade Math
Unit 3: Multi-Digit and Fraction Computation

OVERVIEW

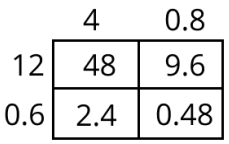
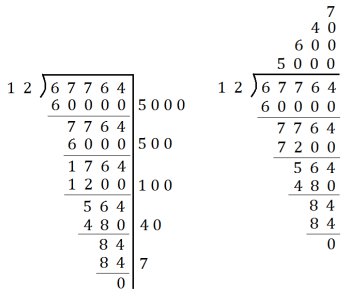
Unit 3 of sixth grade is all about fraction division and decimal computation. While both of these topics sound very procedural, there are a lot of underlying concepts that are important for students to understand. In the first half of the unit, students work toward developing and understanding efficient algorithms, or processes, to divide with fractions. Students start with concrete models, and use them to discover patterns of what happens when a fraction is divided by another fraction. These patterns are generalized into a computation algorithm which students can use to solve and interpret real-world problems.

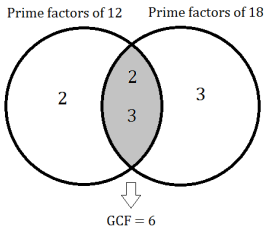
In the second half of this unit, students develop, practice, and demonstrate fluency with decimal operations. The goal is for students to be fluent with decimal computations by the end of the school year. They will continue to have practice opportunities throughout the year, so it is ok if students are not quite yet fluent at this point, halfway through the year.

In earlier grades, students developed their understanding of the base-ten number system. They found answers to computation problems using concrete models, place value, and other strategies. Students **did not** learn a *standard algorithm* until they had the conceptual understanding, or the why and what was happening. Some of these strategies that students have seen in earlier grades are revisited in this unit to ensure that students firmly understand the reasoning behind an algorithm, rather than using it without understanding.

In Unit 4, once students have mastered the positive number system of fractions, decimals, and whole numbers, sixth-grade students will investigate the numbers to the left of 0 on the number line, or negative numbers. Building on this in seventh grade, students will learn how to add, subtract, multiply, and divide with numbers, including negatives. In eighth grade and high school, students learn about a kind of number called irrational, and they apply the same learnings, rounding out their study of the real number system.

Here are some models you may see students using throughout the course of this unit.

Model	Example
Partial products	Multiply 12.6 and 4.8 using partial products. 
Partial quotients	Divide 67,764 by 12 using partial quotients. 

Venn Diagram	Use a Venn diagram to find the GCF of 12 and 18. 

Check out the Student Self-Assessment to read about the unit's standards in student-friendly language.

To access this document online, visit FishtankLearning.org and navigate to this unit's page.

EXAMPLE PROBLEMS FROM UNIT

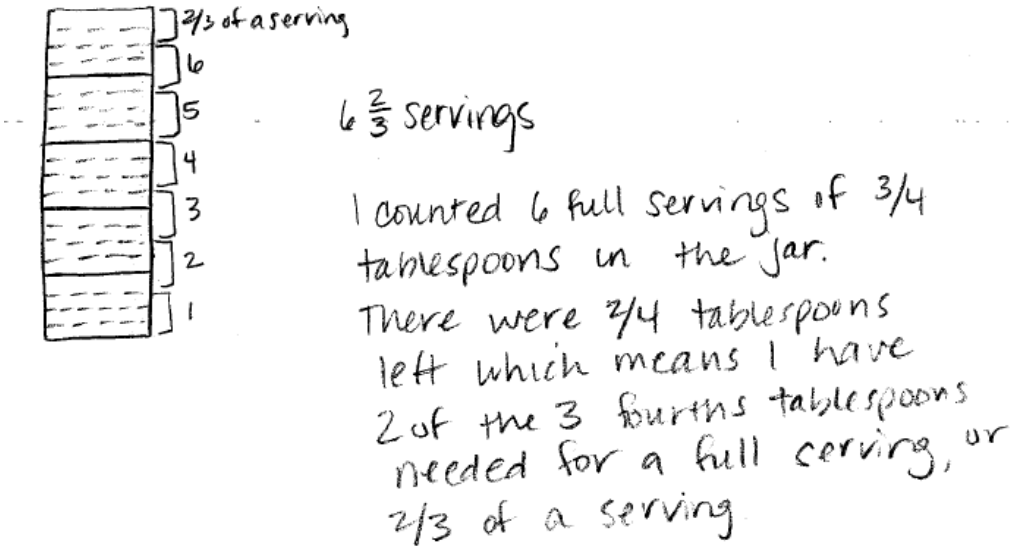
Here are some example problems and student responses from the unit that highlight some of the key concepts students will study:

From Lesson 3, Target Task: Using models to divide with fractions

A jar has 5 tablespoons of honey in it. One serving of honey is $\frac{3}{4}$ of a tablespoon. How many servings of honey are in the jar?

Draw a diagram to solve the problem and explain how your diagram shows the solution.

Student Response



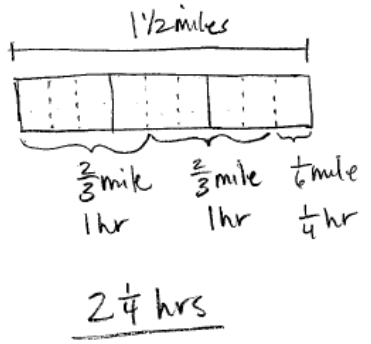
From Lesson 6, Target Task: Solving fraction division problems

(Notice how the model and the equation can both be used to arrive at an answer.)

You are stuck in a big traffic jam on the freeway and you are wondering how long it will take to get to the next exit, which is $1\frac{1}{2}$ miles away. You are timing your progress and find that you travel $\frac{2}{3}$ of a mile in one hour. If you continue to make progress at this rate, how long will it be until you reach the exit?

Solve the problem with a diagram and explain your answer. Then find the answer using an equation and show that it is the same as what you got in your diagram.

Student Response



I drew 1½ miles and divided it into sixths. Every 4/6 mi. is one hour, and I have 2 hours. That leaves 1/6 of a mile left which is 1/4 of an hour.

$1\frac{1}{2} \div \frac{2}{3} = \frac{3}{2} \div \frac{2}{3} = \frac{3}{2} \times \frac{3}{2} = \frac{9}{4}$

or $2\frac{1}{4}$ hrs

References

Illustrative Mathematics *Traffic Jam*
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From Lesson 12, Target Task: Dividing with decimals using the standard algorithm

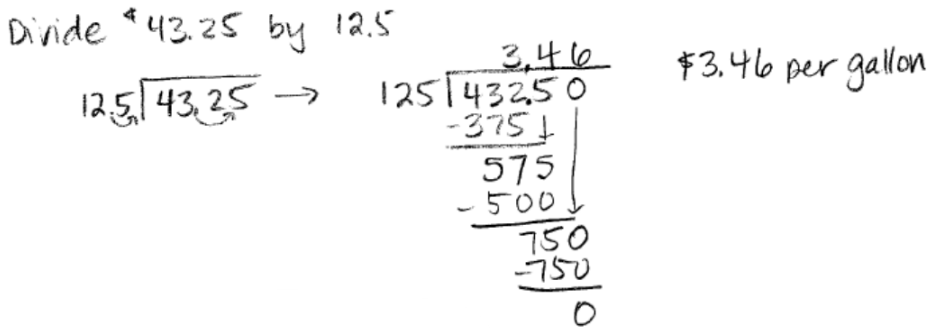
Sophia's dad paid $43.25 for 12.5 gallons of gas.

a. What is the cost of one gallon of gas?

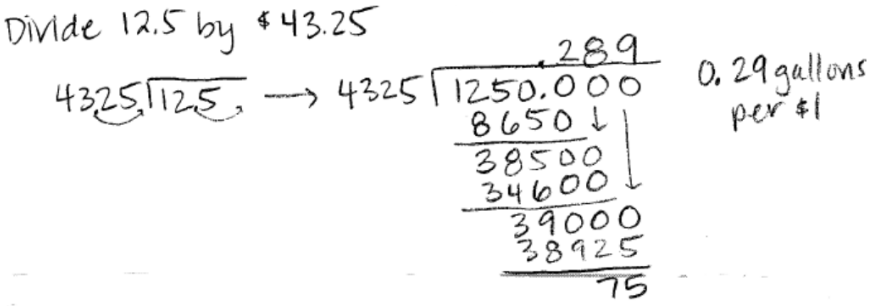
b. Approximately how many gallons of gas can you get for $1? Round to the nearest hundredth.

Student Response

a.



b.



References

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From Lesson 15, Target Task: Finding the greatest common factor

Complete each of the following:

a. List all the factors of 48.

b. List all the factors of 64.

c. What are the common factors of 48 and 64?

d. What is the greatest common factor of 48 and 64?

Student Response

a. Factors of 48:

1, 2, 3, 4, 6, 8, 12, 16, 24, 48

b. Factors of 64:

1, 2, 4, 8, 16, 32, 64

c. Common Factors:

1, 2, 4, 8, 16

d. Greatest common factor:

16

References

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CONNECTIONS AT HOME

Encourage your 6th grader to find math problems in everyday life by asking, "what math question can we ask or answer in this scenario?" This helps students see connections between math and everyday moments. Plus, having students ask the math questions (instead of being asked) can be empowering. Since there are infinite questions that can be asked and answered about the same context, this is an endless source of conversation about math!

Here are some ideas of how you can make connections to everyday life using ideas from this unit:

- Money is a great way to involve decimals at home since dollars and coins naturally include decimals to the hundredths place. Point out the various places where decimal computation occurs with money, such as at the gas station, splitting a bill at a restaurant, or receiving change at a store.
- Measurement and time are great opportunities to think about fractions. In fact, most measurements aren't whole numbers, but rather involve pieces of wholes, such as height, distance, and volume. Point out places where fraction division occurs and encourage students to think about story problems or questions as they relate to these measurements, such as My hand is half a foot long, I wonder how many hands tall I am?, or My recipe calls for 2 and a half cups of rice, I wonder how many scoops of this quarter-cup measuring tool I need to use?

Talking about math

Talking math with your 6th grader is a great way to help them build their skills and confidence. To do this with your student, you don't have to be an expert! Let them tell you about what they know. If there are topics you both have additional questions about, problem solve and do research together. Don't give up if you don't understand. Instead, help your 6th grader make a plan to get help from their teacher–this models mathematical perseverance and builds an important skill in knowing when and who to ask for help. It also shows your 6th grader that learning is a lifelong pursuit!

Here are some questions you can use with your 6th grader to talk about their math work:

- Tell me about a problem you enjoyed solving in math class.
- Tell me about a tricky problem this week and how you persevered to solve it.
- Tell me about what you tried and why you think it didn't work.
- What strategy are you most excited about in this unit?
- Did you learn a new strategy from someone else in your class? Did you teach someone else about a strategy that you use?
- Review a graded assignment together. How might you solve this problem differently? Tell me what you know about this problem? How does that help you answer it?

VOCABULARY

Word	Definition	Example
composite number	A whole number greater than 1 that has factors other than 1 and itself (i.e. is not prime).	6 is a composite number because its factors include 1, 2, 3, and 6.
dividend	In a division problem, the dividend is the number that is being divided by another number.	In the problem 120 divided by 40, 120 is the dividend.
divisor	In a division problem, the divisor is the number by which another number is to be divided. A divisor can also mean a number that divides into an integer with no remainder.	In the problem 120 divided by 40, 40 is the divisor.
greatest common factor (gcf)	The greatest common factor (GCF) of two whole numbers is the greatest of all of the factors in common between the two numbers.	The greatest common factor of 24 and 36 is 12.
least common multiple (lcm)	The least common multiple (LCM) of two whole numbers is the smallest multiple in common between the two numbers.	The least common multiple of 4 and 10 is 20.
long division/ standard algorithm for division	An algorithm for finding the quotient of two numbers written in decimal form.	$\begin{array}{r} 189 \\ 16\overline{)3024} \\ \underline{16} \\ 142 \\ \underline{128} \\ 144 \\ \underline{144} \\ 0 \end{array}$
prime factorization	The factored form of a whole number in which every factor is a prime number.	The prime factorization of 72 is $2^3 \cdot 3^2$.

Word	Definition	Example
prime number	A whole number greater than 1 whose only factors are 1 and itself.	5 is a prime number because the only factors of 5 are 1 and 5. Other prime numbers include 2, 3, 7, 11, 13, 17, 19, 23, 29, and 31. There are an infinite number of prime numbers.
quotient	The result of dividing one quantity by another, or the answer to a division problem.	The quotient of 120 divided by 40 is 3.
reciprocal	The reciprocal of a number is 1 over the number; for a number b, it is $\frac{1}{b}$.	The reciprocal of 3 is $\frac{1}{3}$. The reciprocal of $\frac{3}{4}$ is $\frac{4}{3}$.
relatively prime	Two whole numbers are relatively prime if the only factor they have in common is 1.	4 and 9 are relatively prime because the only factor they share in common is 1.