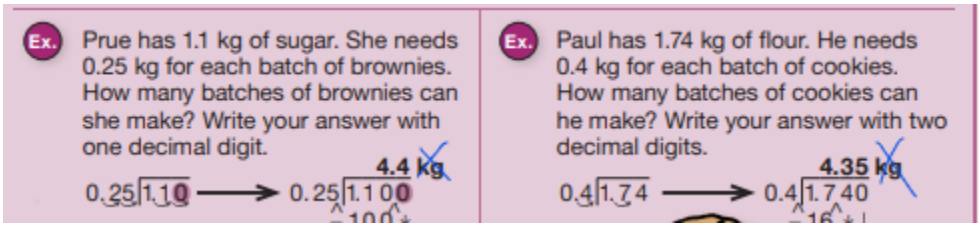
TYPO ALERT IN UNIT 14B!

Hi pilot testers,

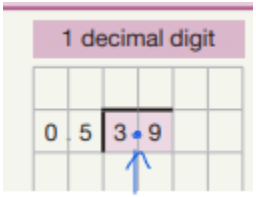
I found several typos in the workbook pages at the last minute, and so there's not time for the graphic designer to fix them before I get the files to you. please make these changes in the workbook before you have your kids start the unit, and my apologies!

Kate

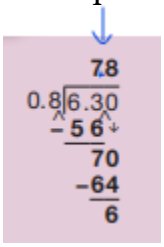
- 14.7, Lesson Activities page, part B, teaching box. Cross out "kg" in the answers to both long division problems.



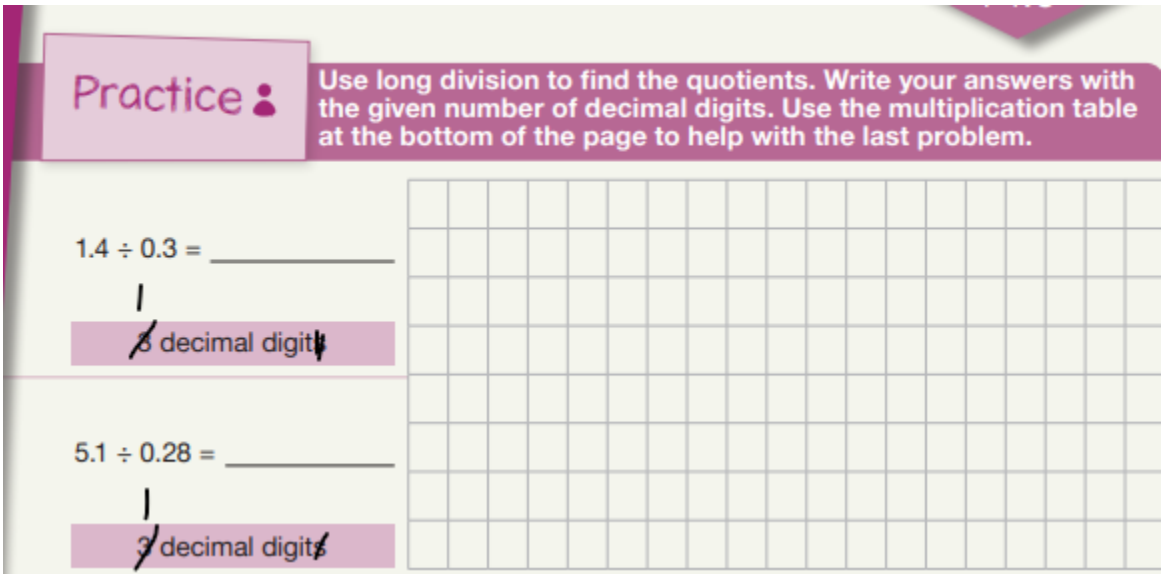
- 14.7, Lesson Activities page, part B, first long division problem. Add a decimal point to make 39 into 3.9.



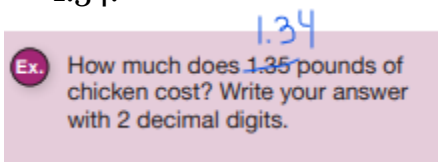
- 14.8, Lesson Activities page, part B, step 2. Add a decimal point between the 7 and 8 in the quotient.



- 14.8, Practice. In the top section, change “3 decimal digits” to “1 decimal digit” for both problems.



- 14.9, Lesson Activities page, part B, teaching box, second example. Change 1.35 to 1.34.



Sixth Grade Math with Confidence
Pilot Test, Unit 14B

Unit 14B: Multiply and Divide Decimals

Overview

In Unit 8, your child reviewed how to multiply and divide decimals by whole numbers. In this unit, he'll learn how to multiply and divide decimals by decimals, both mentally and with the written processes. He'll also learn how to use a calculator to solve problems involving decimals.

What Your Child Will Learn

In this unit your child will learn to:

- Divide decimals by decimals with mental math
- Use long division to divide decimals by decimals and round the quotient to a given number of decimal digits
- Use decimal multiplication and division to solve rate problems
- Use a calculator to multiply or divide decimals

Lesson List for Unit 14B

Lesson 14.5	Divide Decimals with Mental Math
Lesson 14.6	Divide Decimals with Long Division
Lesson 14.7	Tack on Zeros to Divide Decimals
Lesson 14.8	Round Quotients to a Given Place
Lesson 14.9	Use a Calculator to Divide Decimals
Lesson 14.10	Enrichment (Optional)

Extra Materials Needed for Unit 14

- Calculator or calculator app
- For optional Enrichment Lesson:
    - *What's the Point of Math?* DK Publishing, 2020.
    - Sales flyer or online access to a favorite store

Your child will need a calculator or calculator app for some of the lessons in this unit. If possible, use a simple, hand-held calculator. If you don't own a calculator, it's fine to use a calculator app on a phone or tablet instead. Make sure the calculator app is in Basic or Standard mode, and not Scientific or Graphing mode.

Lesson 14.5 – Divide Decimals with Mental Math

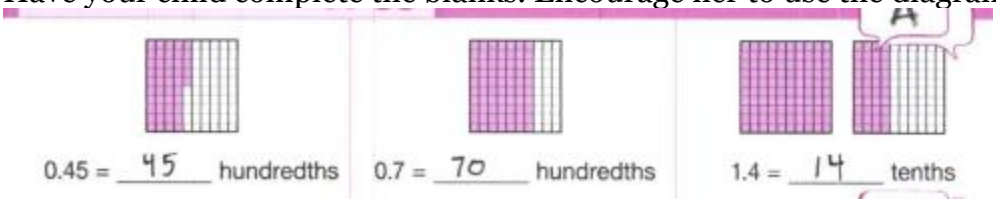
PURPOSE	MATERIALS
• Practice writing decimals as groups of hundredths or tenths • Use mental math to divide decimals by decimals	• None

- **What percent is equivalent to one-half?** *50%.*
- **One-third?** *33 and one-third percent.*
- **Two-thirds?** *66 and two-thirds percent.*
- **One-fourth?** *25%.*
- **Three-fourths?** *75%.*
- **One-fifth?** *20%.*
- **Two-fifths?** *40%.*
- **Three-fifths?** *60%.*
- **Four-fifths?** *80%.*

In this lesson, your child will use mental math to divide simple decimals by decimals. In Lesson 14.6-14.8, your child will learn how to use long division to divide more-complex decimals by decimals.

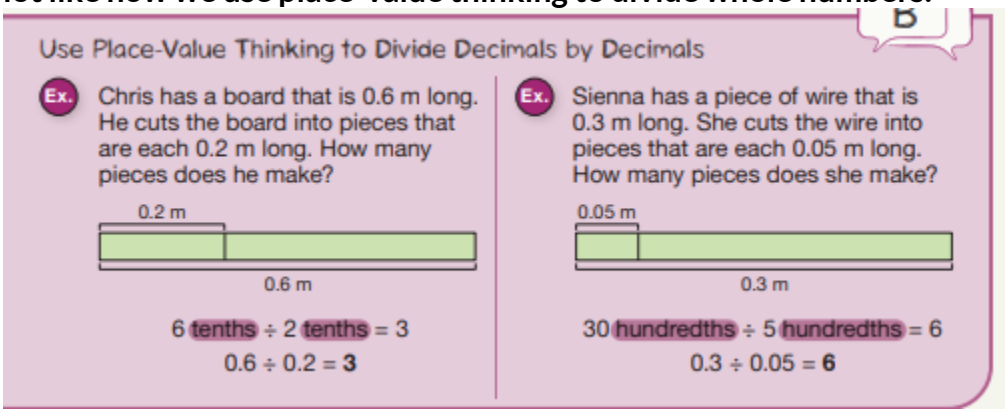
Warm-up (A): Practice Writing Decimals as Groups of Tenths or Hundredths

Have your child complete the blanks. Encourage her to use the diagrams to help.



Activity (B): Use Place-Value Thinking to Divide Whole Numbers by Decimals

Today, you'll learn how to use place-value thinking to divide decimals by decimals. It's a lot like how we use place-value thinking to divide whole numbers.



Read aloud the first example word problem. **The first example shows how to divide 0.6 by 0.2.**

- **0.6 equals how many tenths?** *6*.
- **0.2 equals how many tenths?** *2*.
- **6 tenths divided by 2 tenths equals 3. Chris cuts 3 pieces of wood.**

Read aloud the second example word problem. **The second example shows how to divide 0.3 by 0.05.**

- **0.3 equals how many tenths?** *3*.
- **3 isn't divisible by 5. So, we think of 3 tenths as 30 hundredths instead.**
- **30 hundredths divided by 5 hundredths equals 6. Sienna makes 6 pieces of wire.**

If your child has trouble with these questions, use base-ten blocks to demonstrate.

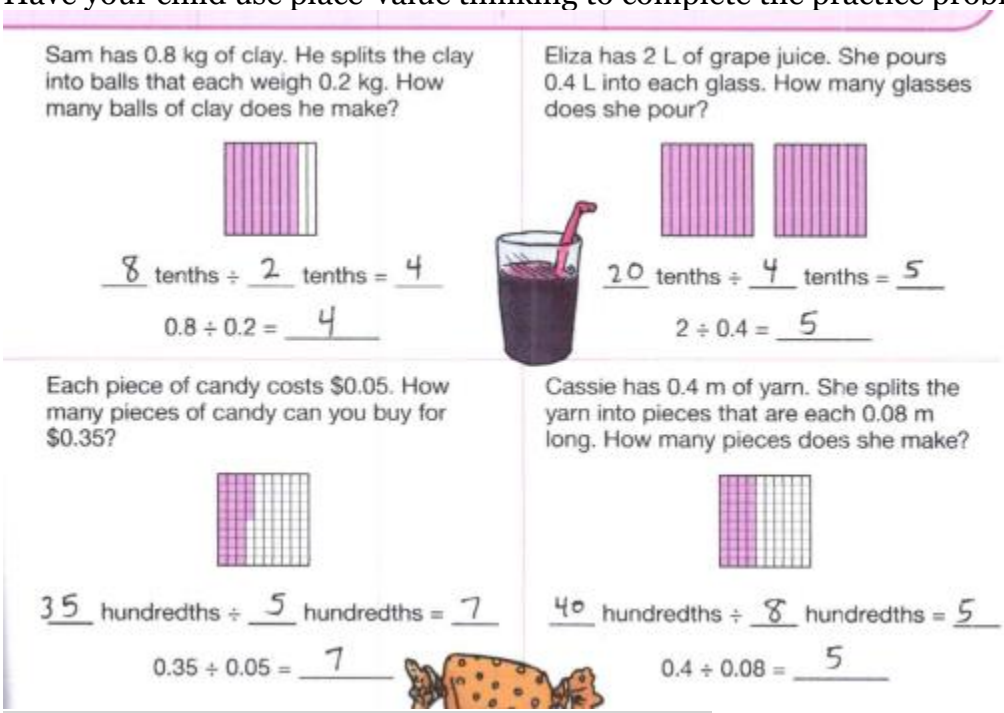
- For 0.6 ÷ 0.2, place 6 rods on the table. **Each rod is one-tenth of the whole flat. We want to split the 6 tenths into groups of 2 tenths. We get 3 groups.**

<6 rods, with circles each group of 2 rods>

- For 0.3 ÷ 0.05, place 3 rods on the table. **3 tenths equal 30 hundredths.** Trade the 3 rods for 30 unit cubes. **If we split 30 hundredths into groups of 5 hundredths, we get 6 groups.**

<3 rods → 30 unit cubes, with circles each group of 5>

Have your child use place-value thinking to complete the practice problems.



Use base-blocks to model the problems as needed.

Independent Practice and Review

Have your child complete the Lesson 14.5 Practice and Review workbook pages.

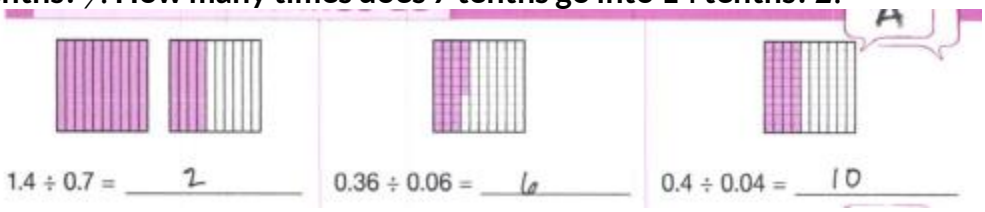
Lesson 14.6 – Divide Decimals with Long Division

PURPOSE	MATERIALS
• Practice mentally dividing decimals by decimals • Use long division to divide decimals by decimals	• None
• **What do we call the number to be divided?** *The dividend.* • **What do we call the number we divide by?** *The divisor.* • **What do we call the result when we divide two numbers?** *The quotient.*	

In Lessons 14.6-14.8, your child will learn how to divide decimals by decimals with long division. The problems in each lesson gradually build in complexity so that your child learns how to move the decimal point, tack on zeros in the dividend as needed, or round the quotient to a given number of decimal digits. In this lesson, your child will focus on learning how to move the decimal point when dividing decimals by decimals. As a result, all of the problems in this lesson have in a whole number quotient. He will find decimal quotients in Lessons 14.7 and 14.8.

Warm-up (A): Practice Mentally Dividing Decimals

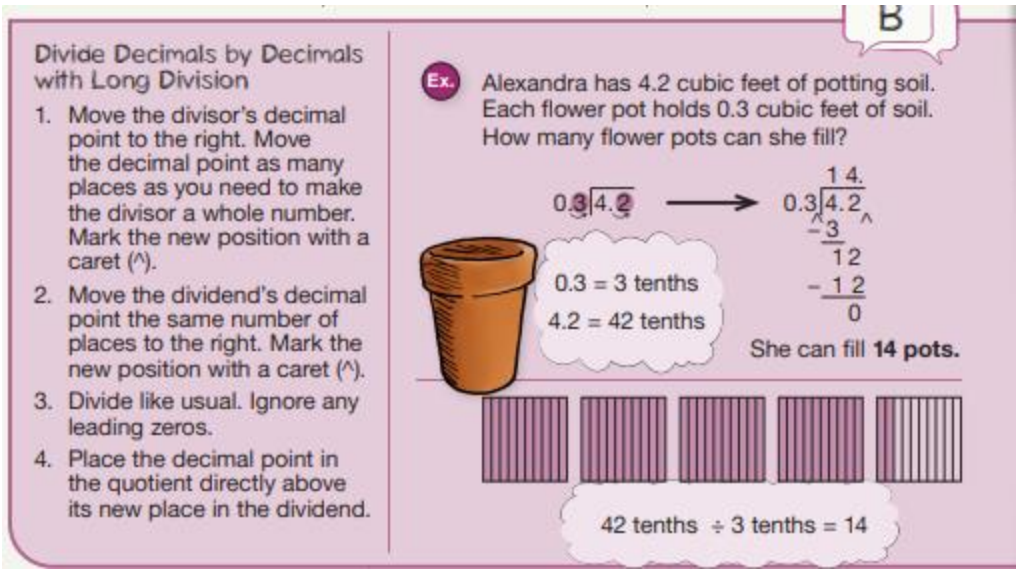
In the last lesson, you learned how to mentally divide decimals by decimals. Have your child complete the problems. Encourage him to use the decimal squares to help. If he has trouble, encourage him to think of the numbers in terms of tenths or hundredths. For example, for 1.4 ÷ 0.7: **1.4 equals how many tenths?** *14*. **0.7 equals how many tenths?** *7*. **How many times does 7 tenths go into 14 tenths?** *2*.



Activity (B): Use Long Division to Divide Decimals by Decimals

In the warm-up, you used place-value thinking to mentally divide decimals. You thought of each decimal as a whole number of tenths or hundredths. Then, you divided like usual to find the answer.

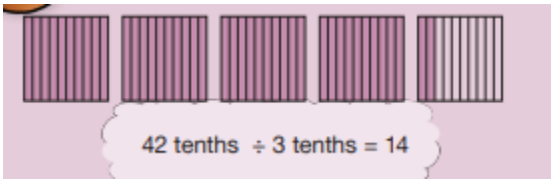
We use a similar process when we divide decimals by decimals with long division. We move the decimal point in the divisor and think of it as a whole number. Then, we move the decimal point in the dividend to match and divide like usual. Have your child read the text box aloud.



Read aloud the example problem. **We need to divide 4.2 by 0.3 to find how many flower pots Alexandra can fill.**

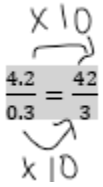
- **0.3 equals how many tenths? *3*. We move the decimal point one place to the right to show that we're thinking of 0.3 as 3 tenths.**
- **4.2 equals 42 tenths. We move the decimal one place to the right to show this, too. We always move both decimal points the same number of places.**
- **We use a symbol called a caret to mark the new position for the decimal point. Using a caret makes the new position easier to see.**
- **After we move the decimal point, we divide like usual with long division.**
- **Last, we write the decimal place in the quotient directly above the caret in the dividend.**
- **4.2 divided by 0.3 equals 14, so Alexandra can fill 14 pots.**

Point to the decimal squares. **These decimal squares represent 4.2. If you divide the tenths into groups of 3, you get 14 groups of 3 tenths.**



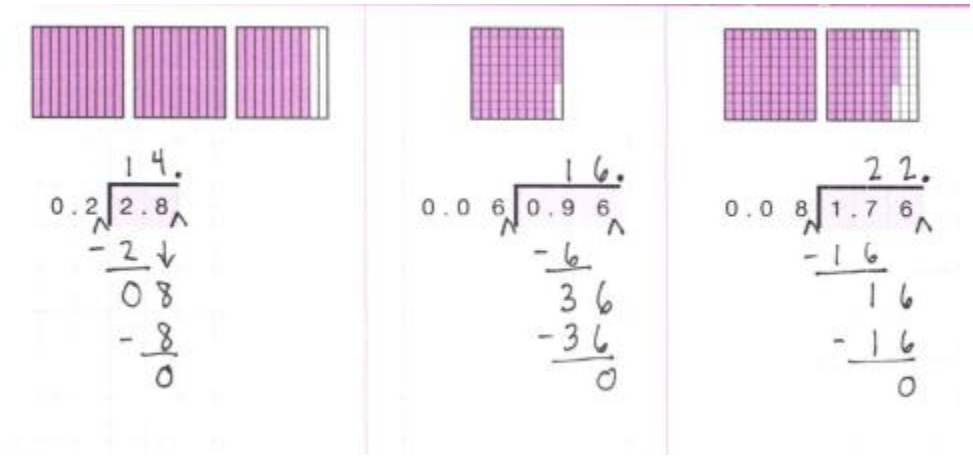
Some children prefer to place the decimal point in the quotient immediately after placing the caret. Either way is fine.

If your child is interested, explain that we can also use equivalent fractions to understand why we move the decimal point the same number of places in both dividend and divisor. **Moving the decimal point one place to the right in both numbers is like multiplying both the numerator and denominator by 10. As long as we multiply both numbers by the same number, the quotient remains the same.**



Have your child follow the steps to solve the practice problems. Before he begins each problem, help him move the decimal point and discuss how the decimal squares match the problems.

- For 2.8 ÷ 0.2: **There is one decimal place in 0.2, so we move both decimal points one place to the right. We want to find how many times 2 tenths goes into 28 tenths.**
- For 0.96 ÷ 0.06: **There are two decimal places in 0.06, so we move both decimal points two places to the right. We want to find how many times 6 hundredths goes into 96 hundredths.**
- For 1.76 ÷ 0.08: **There are two decimal places in 0.08, so we move both decimal points two places to the right. We want to find how many times 8 hundredths goes into 176 hundredths.**



Independent Practice and Review

Have your child complete the Lesson 14.6 Practice and Review workbook pages.

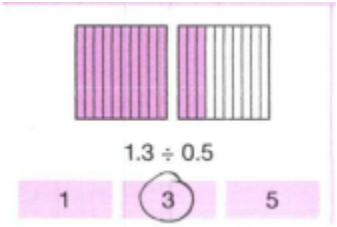
Lesson 14.7 – Tack on Zeros to Divide Decimals

PURPOSE	MATERIALS
• Estimate answers to decimal division problems • Fill in zeros when moving the decimal point in long division problems • Tack on zeros and divide to a given place in long division problems	• None
• **What is an equation?** *A number sentence with an equals sign.* • **What is an inequality?** *A number sentence that compares quantities.* • **What is an expression?** *Part of a number sentence without an equals sign.*	

In Lesson 8.8, your child learned how to tack on zeros in decimal long division problems and round decimal quotients to a given place. In this lesson, your child will use the same technique to divide decimals by decimals.

Warm-up (A): Estimate Decimal Division Quotients

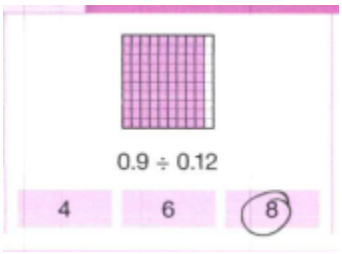
To warm up, we'll choose the best estimate for each quotient. The first problem is 1.3 divided by 0.5. Does 0.5 go into 1.3 about 1 time, about 3 times, or about 5 times? *About 3 times.* If your child's not sure, encourage her to think of each number as a number of tenths: **1.3 equals 13 tenths, and 0.5 equals 5 tenths. What's 13 divided by 5?** *2, with a remainder of 3.* **That's close to 3, so 3 is the best estimate.**



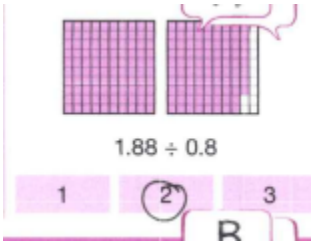
If your child has trouble understanding this explanation, draw lines on the decimal square to show dividing the 13 tenths into groups of 5 tenths.

Caption: You can make nearly 3 groups of 5 tenths from 1.5.

The second problem is 0.9 divided by 0.12. 0.12 is close to 0.1, so we can estimate the problem by dividing 0.9 by 0.1. Does 0.1 go into 0.9 about 4 times, about 6 times, or about 8 times? *About 8 times.* If your child's not sure, encourage her to think of each number as a number of tenths: **0.9 equals 9 tenths, and 0.1 equals 1 tenth. What's 9 divided by 1?** *9.* **That's close to 8, so 8 is the best estimate.**



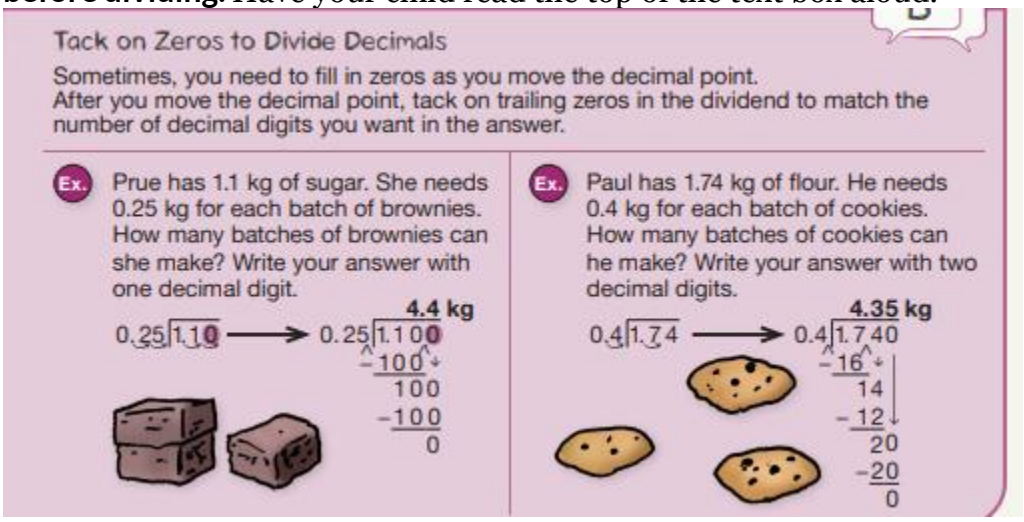
The third problem is 1.88 divided by 0.8. 1.88 is approximately 1.9, so we can estimate the problem by dividing 1.9 by 0.8. Does 0.8 go into 1.9 about 1 time, about 2 times, or about 3 times? *About 2 times.* If your child's not sure, encourage her to think of each number as a number of tenths: **1.9 equals 19 tenths, and 0.8 equals 8 tenths. What's 19 divided by 8?** *2, with a remainder of 1.* **That's close to 2, so 2 is the best estimate.**



Activity (B): Tack on Zeros in Decimal Long Division Problems

In the last lesson, you learned how to divide decimals by decimals with long division. We moved the decimal point to make the divisor a whole number. Then, we moved the decimal point in the dividend the same number of places.

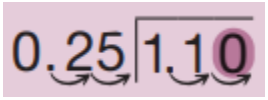
Today, you'll learn how to solve decimal division problems that require tacking on zeros before dividing. Have your child read the top of the text box aloud.



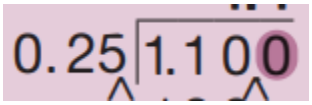
Read aloud the first example problem. **We need to divide 1.1 by 0.25 to find how many batches of brownies Prue can make.**

- **0.25 equals how many hundredths?** *25.* **We move the decimal point two places to the right to show that we're thinking of 0.25 as 25 hundredths.**

- **We need to move the decimal point in the dividend two places to the right as well. 1.1 only has one decimal digit, so we fill in a 0 in the hundredths-place as we move the decimal point.**



- **The caret shows the new position for the decimal point. The question says to write the answer with one decimal digit, so we tack on a trailing zero in the new tenths-place.**



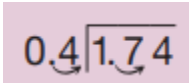
- **Then, we divide like usual. 110 hundredths divided by 25 hundredths equals 4.4. Prue can make 4.4 batches of brownies.**

To make this problem more concrete, use base-ten blocks to model it. Place 1 flat and 1 rod on the table. **1.1 equals 110 hundredths, and 0.25 equals 25 hundredths. 110 hundredths divided by 25 hundredths equals 4 groups, plus part of a group.**

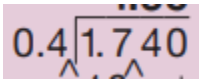
<1 flat, 1 rod>

Discuss the second example problem in the same way. **We need to divide 1.74 by 0.4 to find how many batches of cookies Paul can make.**

- **0.4 equals how many tenths? *4*. We move the decimal point one place to the right to show that we're thinking of 0.4 as 4 tenths.**
- **We need to move the decimal point in the dividend one place to the right as well. 1.74 has two decimal digits, but we only move the decimal point *one* place, to match how we moved the decimal point in 0.4.**



- **The caret shows the new position for the decimal point. The question says to write the answer with two decimal digits. There's already a 4 in the new tenths-place, so we tack on a trailing zero in the new hundredths-place.**

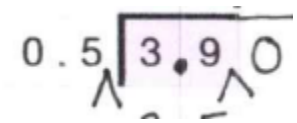


- **Then, we divide like usual. 17.4 tenths divided by 4 tenths equals 4.35. Paul can make 4.35 batches of cookies.**

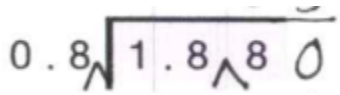
To make this problem more concrete, use base-ten blocks to model it. Place 17 rods, and 4 unit blocks on the table. **1.74 equals 17.4 tenths. 17.4 tenths divided by 4 tenths equals 4 groups, plus part of a group.**

Have your child follow the steps to solve the practice problems. Before he begins each problem, help him move the decimal point and fill in or tack on zeros.

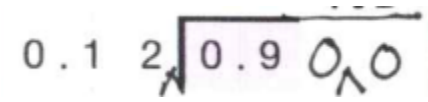
- For 3.9 ÷ 0.5: **There is one decimal place in 0.5, so we move both decimal points one place to the right. The directions say to write the answer with 1 decimal digit, so we tack on one trailing zero in the new tenths-place.**

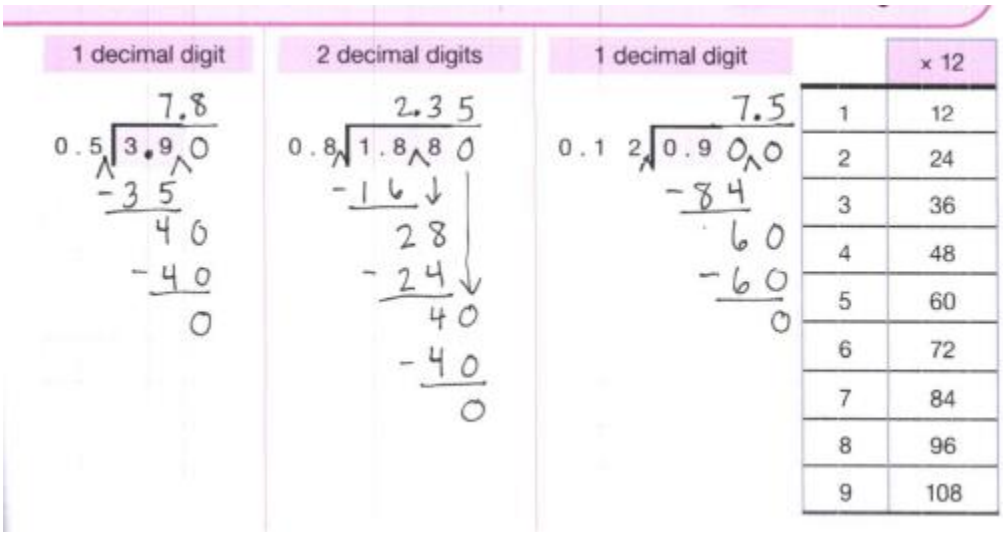


- For 1.88 ÷ 0.8: **There is one decimal place in 0.8, so we move both decimal points one place to the right. The directions say to write the answer with 2 decimal digits, so we tack on one trailing zero in the new hundredths-place.**



- For 0.9 ÷ 0.12: **There are two decimal places in 0.12, so we move both decimal points two places to the right. We fill in a zero as we move the decimal point. The directions say to write the answer with 1 decimal digit, so we tack on one more trailing zero in the new tenths-place.**





If your child has trouble knowing how many zeros to tack on in the dividend, have her first place the decimal point in the quotient. This makes it easier to see the place value of the digits in the quotient and know far to divide.

Independent Practice and Review

Have your child complete the Lesson 14.7 Practice and Review workbook pages.

Lesson 14.8 – Round Quotients to a Given Place

PURPOSE	MATERIALS
• Practice rounding decimals to a given place • Express decimal quotients with a given number of decimal digits (and round if needed)	• None

- **What do we call a letter that stands for a number?** *A variable.*
- **What do we call a number multiplied by a variable?** *A coefficient.*
- **What do we call the parts of an expression that are added or subtracted?** *Terms.*
- **What do we call a term with only a number and no variable part?** *A constant.*

Warm-up (A): Practice Rounding Decimals to a Given Place

Have your child round each number to the underlined place.

1.385 ≈ 1.39 0.763 ≈ 0.8 16.499 ≈ 16

Activity (B): Tack on Trailing Zeros and Round Quotients to a Given Number of Decimal Digits

In the last lesson, you learned how to tack on zeros when dividing decimals by decimals with long division. Sometimes, you needed to fill in zeros as you moved the decimal point. Other times, you tacked on a trailing zero so that you could express your answer with a given number of decimal digits.

In the long division problems in the last lesson, there was never a remainder after you divided to the given number of decimal places. Today, you'll solve problems where there's a remainder after you divide to the given number of decimal places. Just like in Unit 8, you'll tack on another trailing zero, divide one more time, and then round your answer to the given number of decimal places. Have your child read the example problem aloud.

B

Round Quotients to a Given Number of Decimal Digits

Ex. The bag of chips weighs 6.3 ounces. Each serving is 0.8 ounces. How many servings are in the bag? Write your answer with 1 decimal digit.

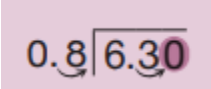
1. Set up the problem and move the decimal point. Tack on trailing zeros to match the number of decimal digits you want in the answer.
2. Follow the long division steps.
3. If there is a remainder, tack on 1 more zero and follow the long division steps again. Round your answer to the correct number of decimal digits.

$0.8\overline{)6.30}$ → $0.8\overline{)6.30}$ (78; −56; 70; −64; 6) → $0.8\overline{)6.300}$ (7.87; −56; 70; −64; 60)

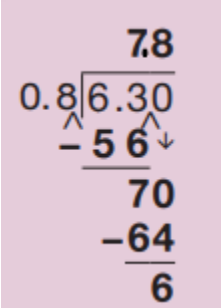
7.87 ≈ **7.9 servings**

We need to divide 6.3 by 0.8 to find how many servings of chips are in the bag.

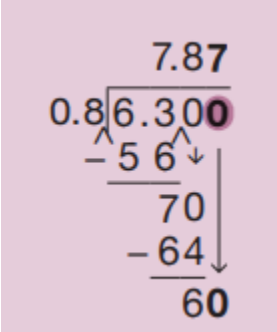
- Read aloud step 1. **0.8 has 1 decimal digit, so we move both decimal digits one place to the right. The question says to write the answer with one decimal digit, so we tack on a trailing zero in the new tenths-place.**



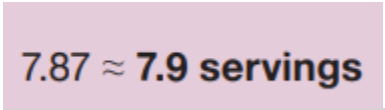
- Read aloud step 2. **After we divide all the digits, there's still a remainder.**



- Read aloud step 3. **We tack on 1 more zero and divide one more time to find the next digit in the quotient. We only need to find the next decimal digit in the quotient, so we don't have to complete the multiply, subtract or bring down steps for the final digit.**



- **We want to have 1 decimal digit in the final answer, so we round the quotient to the tenths-place. 7.87 rounded to the tenths-place is 7.9. There are 7.9 servings of chips in the bag.**



If your child finds it unsatisfying to leave the long division steps unfinished, it's fine for him to complete them in the practice problems.

Have your child follow the steps to solve the practice problems.

The ice cream container weighs 0.84 kg. Each serving of ice cream weighs 0.09 kg. How many servings are in the container? Write your answer with 1 decimal digit.

$$0.09\overline{)0.84^{\wedge}00} = 9.33$$

-81

30

-27

30

9.3 servings

One bottle of soda holds 2 liters. Each serving is 0.22 liters. How many servings are in the bottle? Write your answer with 1 decimal digit.

$$0.22\overline{)2.00^{\wedge}00} = 9.09$$

-198

20

$-\ 0$

200

9.1 servings

	× 22
1	22
2	44
3	66
4	88
5	110
6	132
7	154
8	176
9	198

Independent Practice and Review

Have your child complete the Lesson 14.8 Practice and Review workbook pages.

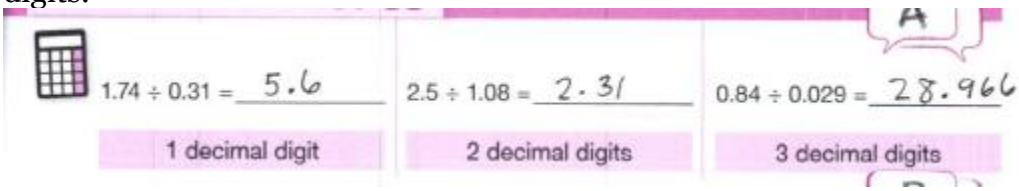
Lesson 14.9 – Use a Calculator to Divide Decimals

PURPOSE	MATERIALS
• Use a calculator to divide decimals and round the quotients • Use a calculator to solve rate problems that involve dividing and multiplying decimals	• Calculator or calculator app

- **What is the absolute value of a number?** *The number's distance from 0 on the number line.*
- **What is the opposite of a positive number?** *The negative number with the same distance from 0 (or the same absolute value).*
- **What is the opposite of a negative number?** *The positive number with the same distance from 0 (or the same absolute value).*
- **What is the opposite of 0?** *0.*

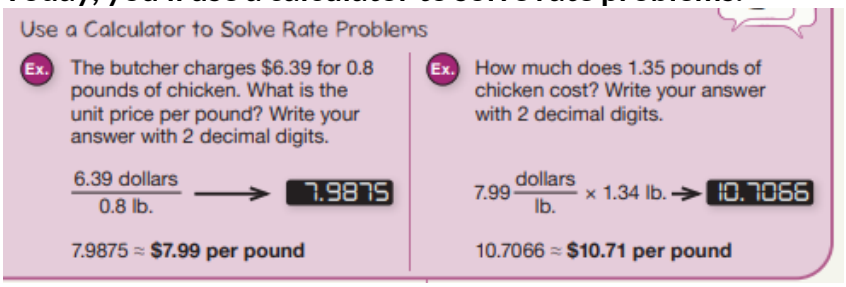
Warm-up (A): Use a Calculator to Divide Decimals

You may use a calculator for the Lesson Activities and Practice pages today. As a warm-up, we'll use a calculator to solve these problems. Have your child use a calculator to find each quotient and round the calculator's answers to the given number of decimal digits.



Activity (B): Use a Calculator to Solve Rate Problems

Today, you'll use a calculator to solve rate problems.



The first example reviews how to find a unit rate. Read the example problem aloud.

- **We want to find the unit price in dollars per pound. So, we write 6.39 dollars above the fraction bar and 0.8 pounds below the fraction bar.**
- **Does it look funny to see decimals above and below the fraction bar?** *Answers will vary.* **Writing the division problem with a fraction bar makes it easier to know which number is the dividend and which is the divisor. Think of this expression as a division problem, not a fraction.**
- **When you divide 6.39 by 0.8 with a calculator, the display shows 7.9875. We write money amounts with 2 decimal digits, so we round the number to the hundredths-place.**

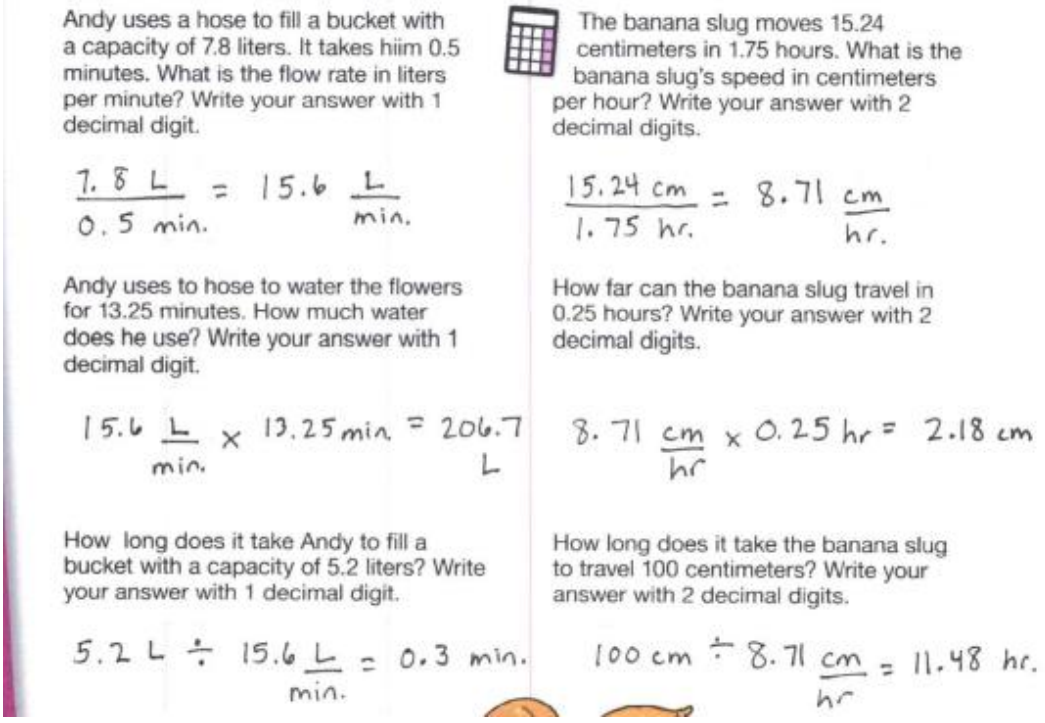
- **What is the unit price for chicken?** *$7.99 per pound*.

The second example reviews how to use a unit price to find total cost. Read the example problem aloud.

- **We want to find how much 1.34 pounds of chicken cost. So, we multiply the unit price times 1.34.**
- **When you multiply 7.99 times 1.34 with a calculator, the display shows 10.7066. We write money amounts with 2 decimal digits, so we round the number to the hundredths-place.**
- **What is the total cost for 1.34 pounds of chicken?** *$10.71*.

Sometimes, kids feel confused by rate problems with decimals, because there are so many digits to keep track of. If you're not sure how to solve a rate problem, think about how you would solve it if the numbers were whole numbers.
Have your child use a calculator to solve the rate problems. He should clear the calculator between each problem and use the rounded version of the unit rate to solve the related problems.

Discuss the real-life meanings of the problems as your child solves them. For example, for the final question about Andy: **It takes 0.3 minutes for Andy to fill the bucket. There are 60 seconds in a minute, so about how long does it take for him to fill the bucket?** *About 20 seconds*. Or, for the final banana slug problem: **100 centimeters equals 1 meter. It takes the banana slug over 11 hours to move 1 meter!**



Independent Practice and Review

Have your child complete the Lesson 14.9 Practice and Review workbook pages.

Lesson 14.10 – Enrichment (Optional)

PURPOSE	MATERIALS
• Review memory work • Appreciate how math can be used in real-life situations • Find sales tax • Summarize what your child has learned and assess your child's progress	• *What's the Point of Math?* • Sales flyer or online access to a favorite store • Calculator or calculator app

Warm-up: Review Memory Work

Quiz your child on any of the memory work items that he struggled with during this unit.

Math Book: *What's the Point of Math?*

Read page 31 in *What's the Point of Math?*

Enrichment Activity: Calculate Sales Tax for a Shopping Spree

In this unit, you've learned how to use a calculator to add, subtract, multiply, and divide decimals. You've also learned how to find a percentage of a decimal. Today, you'll use your skills for a shopping spree! We'll pretend that you've won a $50 gift card to your favorite store. You can spend up to $50 at the store, but the $50 must include the sales tax.

Have your child use the store's sales flyer or website to find some items he'd like to buy. Have him make a list of the items along with their prices, and have him add to find the pre-tax subtotal.

Chemistry set……..$35.99
Safety goggles……..$8.99
Subtotal……$43.98

Then, have your child use your local sales tax rate to calculate the sales tax on the items. He should add the tax to the subtotal to find the final total. If the final total is greater than $50, have him adjust his list until the final total is below $50.

0.05 × 43.98 = $2.20

Subtotal…… $43.98
Tax (5%) …… $2.20
Total…… $46.18

If your state does not have sales tax, have your child choose a different state that he would like to visit. Use the internet to find the sales tax in that state.

Unit Wrap-Up

Have your child complete the Unit 14 Wrap-Up.

Unit 14 Checkpoint

What to Expect at the End of Unit 14

By the end of Unit 14, most children will be able to do the following:

- Multiply decimals by decimals with mental math or the written algorithm. Most children will be able to confidently place the decimal point in their answers. Many children will still make an occasional mistake with the steps in the multiplication algorithm or multiplication facts.
- Use decimal multiplication to find percentages of whole numbers and decimals.
- Use place-value thinking to divide decimals by decimals with mental math. Some children will need help naming the decimals as groups of tenths or hundredths before dividing.
- Use long division to divide decimals by decimals. Some children will need help moving the decimal point or tacking on zeros. Many children will still make an occasional mistake with the long division steps.
- Tack on zeros to the dividend to find quotients to a given place. Many children will still need help deciding how many digits to tack on and when to stop dividing.
- Use decimal multiplication and division to solve rate problems.
- Use a calculator to multiply or divide decimals.

Is Your Child Ready to Move on?

In Unit 15, your child will study data and statistics. You will also review what your child has learned and celebrate completing the book!

Your child does not need to have fully mastered multiplying and dividing decimals by before moving on to Unit 15.