Kenmore-Town of Tonawanda UFSD

We educate, prepare, and inspire all students to achieve their highest potential

Grade 5 Module 1
Parent Handbook

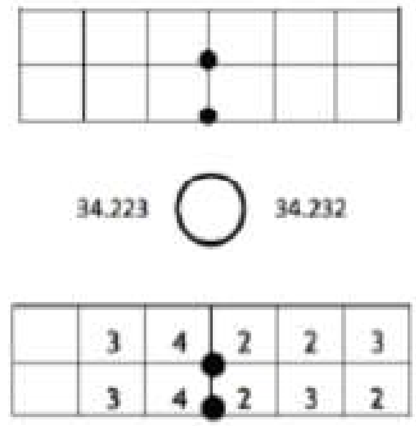
The materials contained within this packet have been taken from the Great Minds curriculum Eureka Math.

Eureka Math™ Tips for Parents

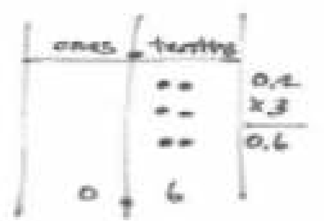
Grade 5 Module 1

Place Value and Decimal Fractions

In this first module of Grade 5, we will extend 4th grade place value work to multi-digit numbers with decimals to the thousandths place. Students will learn the pattern that one-tenth times any digit on the place value chart moves it one place value to the right. They will also perform decimal operations to the hundredths place.



Place value chart for comparing decimals using <, >, =



0.2 x 3 on the place value chart.

Notice how the dots for two tenths are simply repeated three times for a total of 0.6, or six tenths.

What Comes After this Module:

In Module 2, we will continue to work with place value, moving to multiplication and division of decimal numbers. We move from concrete models to more abstract algorithms, always anchoring our work in our knowledge of place value patterns.

Terms, Phrases, and Strategies in this Module:

Thousandths: related to place value (we have already studied tenths and hundredths)

Exponents: how many times a number is to be used in a multiplication sentence

Millimeter: a metric unit of length equal to one thousandth of a meter

Equation: statement that two mathematical expressions have the same value, indicated by use of the symbol =; e.g., 12 = 4 x 2 + 4

Place value: the numerical value that a digit has by virtue of its position in a number

Standard form: a number written in the format: 135

Expanded form: e.g., 100 + 30 + 5 = 135

Unit form: e.g., 3.21 = 3 ones 2 tenths 1 hundredth

Word form: e.g., one hundred thirty-five

+ How you can help at home:

- When given a multi-digit number with decimal digits, ask your student what each digit represents (e.g., "What is the value of the 4 in the number 37.346?")
- Help practice writing numbers correctly by saying multi-digit decimal numbers and having your student write them down. Students can create their own place value charts to help

Key Common Core Standards:

- *Understand the place value system*
  - Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left
  - Explain patterns in the number of zeros of the product when multiplying whole numbers by powers of 10
  - Read, write, and compare decimals to thousandths
  - Use place value understanding to round decimals to any place
- *Perform operations with multi-digit whole numbers and with decimals to hundredths*
  - Add, subtract, multiply, and divide decimals to hundredths
- *Convert like measurement units within a given measurement system*
  - Convert among different-sized standard measurement units within a given measurement system

Prepared by Erin Schweng, Math Coach

Welcome to *A Story of Units*!

Each module's parent tip sheet will highlight a new strategy or math model your student will be working on.

Place Value Chart - In Module 1, students will make extensive use of place value tools, as they have done in earlier grade levels. Now, however, students work with the extended place value chart, which includes place values to the thousandths.

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
1 ÷10									
	1								

(Above) Place Value Chart, with the thousandths place

(Below) 27.346 on the chart

tens	ones	•	tenths	hundredths	thousandths
2	7		3	4	6

Read on to learn a little bit about *Eureka Math*, the creators of *A Story of Units:*

Eureka Math is a complete, PreK-12 curriculum and professional development platform. It follows the focus and coherence of the Common Core State Standards (CCSS) and carefully sequences the progression of mathematical ideas into expertly crafted instructional modules.

This curriculum is distinguished not only by its adherence to the CCSS; it is also based on a theory of teaching math that is proven to work. That theory posits that mathematical knowledge is conveyed most effectively when it is taught in a sequence that follows the "story" of mathematics itself. This is why we call the elementary portion of *Eureka Math* "*A Story of Units*." The sequencing has been joined with methods of instruction that have been proven to work, in this nation and abroad. These methods drive student understanding beyond process, to deep mastery of mathematical concepts.

The goal of *Eureka Math* is to produce students who are not merely literate, but fluent, in mathematics. Your student has an exciting year of discovering the story of mathematics ahead!

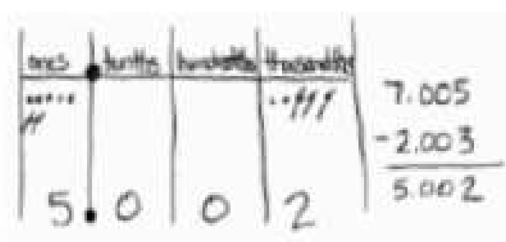
Sample Problem from Module 1:

(Example taken from Module 1, Lesson 10)

Teacher says:

"Subtract 2 ones 3 thousandths from 7 ones 5 thousandths."

Students use place value chart to solve.



Grade 5 • Module 1

Place Value and Decimal Fractions

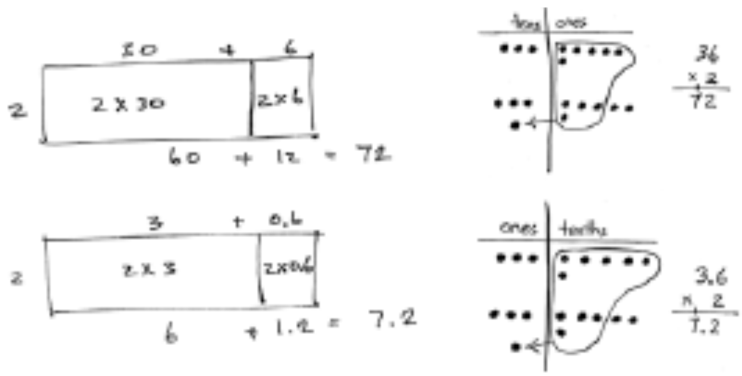
OVERVIEW

In Module 1, students' understandings of the patterns in the base ten system are extended from Grade 4's work with place value to include decimals to the thousandths place. In Grade 5, students deepen their knowledge through a more generalized understanding of the relationships between and among adjacent places on the place value chart, e.g., 1 tenth times any digit on the place value chart moves the digit one place value to the right (**5.NBT.1**). Toward the module's end, students apply these new understandings as they reason about and perform decimal operations through the hundredths place.

Topic A opens the module with a conceptual exploration of the multiplicative patterns of the base ten system using place value disks and a place value chart. Students notice that multiplying by 1,000 is the same as multiplying by $10 \times 10 \times 10$. Since each factor of 10 shifts the digits one place to the left, multiplying by $10 \times 10 \times 10$—which can be recorded in exponential form as 103 (**5.NBT.2**)—shifts the position of the digits to the left 3 places, thus changing the digits' relationships to the decimal point (**5.NBT.2**). Application of these place value understandings to problem solving with metric conversions completes Topic A (**5.MD.1**).

Topic B moves into the naming of decimal fraction numbers in expanded, unit (e.g., 4.23 = 4 ones 2 tenths 3 hundredths), and word forms and concludes with using like units to compare decimal fractions. Now in Grade 5, students use exponents and the unit fraction to represent expanded form, e.g., $2 \times 102 + 3 \times (1/10) + 4 \times (1/100) = 200.34$ (**5.NBT.3**). Further, students reason about differences in the values of like place value units and express those comparisons with symbols (>, <, and =). Students generalize their knowledge of rounding whole numbers to round decimal numbers in Topic C, initially using a vertical number line to interpret the result as an approximation and then eventually moving away from the visual model (**5.NBT.4**).

In the latter topics of Module 1, students use the relationships of adjacent units and generalize whole number algorithms to decimal fraction operations (**5.NBT.7**). Topic D uses unit form to connect general methods for addition and subtraction with whole numbers to decimal addition and subtraction, e.g., 7 tens + 8 tens = 15 tens = 150 is analogous to 7 tenths + 8 tenths = 15 tenths = 1.5.



Topic E bridges the gap between Grade 4 work with multiplication and the standard algorithm by focusing on an intermediate step—reasoning about multiplying a decimal by a one-digit whole number. The area model, with which students have had extensive experience since Grade 3, is used as a scaffold for this work.

Topic F concludes Module 1 with a similar exploration of division of decimal numbers by one-digit whole number divisors. Students solidify their skills with an understanding of the algorithm before moving on to long division involving two-digit divisors in Module 2.

Terminology

New or Recently Introduced Terms

- Exponent (how many times a number is to be used in a multiplication sentence)
- Millimeter (a metric unit of length equal to one-thousandth of a meter)
- Thousandths (related to place value)

NOTES ON *EXPRESSION, EQUATION,* AND *NUMBER SENTENCE*:

Please note the descriptions for the following terms, which are frequently misused.

- **Expression:** A number, or any combination of sums, differences, products, or divisions of numbers that evaluates to a number (e.g., $3 + 4$, 8×3, $15 \div 3$ as distinct from an equation or number sentence).
- **Equation:** A statement that two expressions are equal (e.g., $3 \times \_\_\_ = 12$, $5 \times b = 20$, $3 + 2 = 5$).
- **Number sentence** (also addition, subtraction, multiplication, or division sentence): An equation or inequality for which both expressions are numerical and can be evaluated to a single number (e.g., $4 + 3 = 6 + 1$, $2 = 2$, $21 > 7 \times 2$, $5 \div 5 = 1$). Number sentences are either true or false (e.g., $4 + 4 < 6 \times 2$ and $21 \div 7 = 4$) and contain no unknowns.

Familiar Terms and Symbols

- >, <, = (greater than, less than, equal to)
- Base ten units (place value units)
- Bundling, making, renaming, changing, regrouping, trading
- Centimeter (cm, a unit of measure equal to one-hundredth of a meter)
- Digit (any of the numbers 0 to 9; e.g., what is the value of the digit in the tens place?)
- Expanded form (e.g., $135 = 1 \times 100 + 3 \times 10 + 5 \times 1$)
- Hundredths (as related to place value)
- Number line (a line marked with numbers at evenly spaced intervals)
- Number sentence (e.g., $4 + 3 = 7$)
- Place value (the numerical value that a digit has by virtue of its position in a number)
- Standard form (a number written in the format: 135)
- Tenths (as related to place value)
- Unbundling, breaking, renaming, changing, regrouping, trading
- Unit form (e.g., 3.21 = 3 ones 2 tenths 1 hundredth)
- Word form (e.g., one hundred thirty-five)

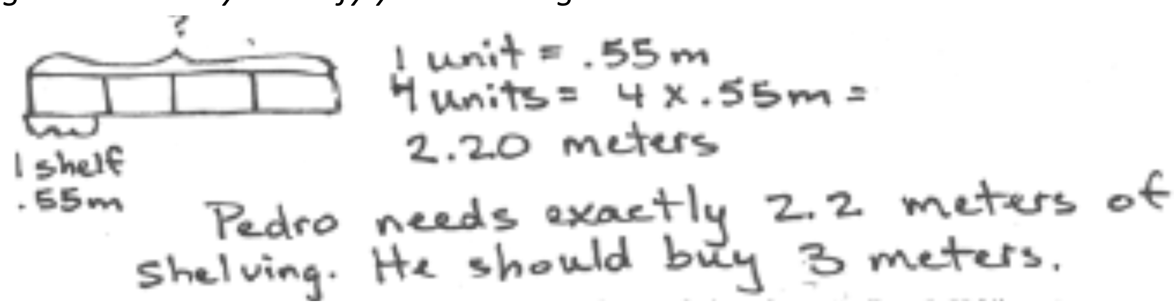
Suggested Tools and Representations

- Number lines (a variety of templates, including a large one for the back wall of the classroom)
- Place value charts (at least one per student for an insert in their personal board)
- Place value disks

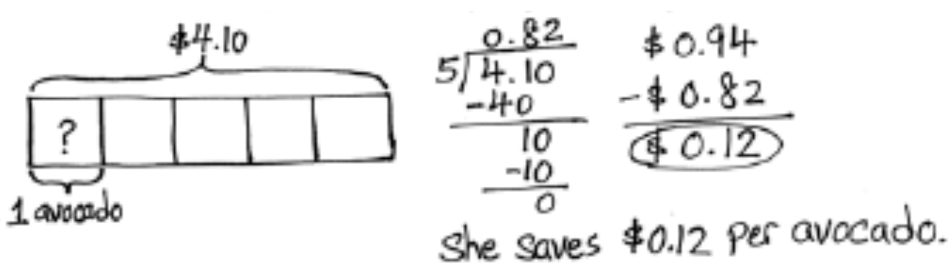
Tape Diagrams

A tape diagram is a way for students to visually represent a mathematical problem. It helps students to break down and make sense of a word problem. It provides students access to selecting the appropriate operation as they visualize the relationships between the quantities. Tape diagrams enable students to solve problems efficiently. In Grade 5 Module 1 students will utilize tape diagrams to solve problems using all four operations with multi-digit whole numbers and decimal fractions. Several examples follow:

Pedro is building a spice rack with 4 shelves that are each 0.55 meter long. At the hardware store, he can only buy the shelving in whole meter lengths. Exactly how many meters of shelving does Pedro need? Since he can only buy whole number lengths, how many meters of shelving should he buy? Justify your thinking.



Esperanza usually buys avocados for $0.94 each. During a sale, she gets 5 for $4.10. How much did she save per avocado?



Watch a short video example of a student using a tape diagram at:
https://www.youtube.com/watch?v=GT4fEhfE_8E

Additional Resources for Parents can be found at:
http://greatminds.net/parents

Grade 5 Module 1 Topic A

Multiplicative Patterns on the Place Value Chart

Focus Standards:

5.NBT.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

5.MD.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

Instructional Days Recommended: 4

Topic A begins with a conceptual exploration of the multiplicative patterns of the base ten system. This exploration extends the place value work done with multi-digit whole numbers in Grade 4 to larger multi-digit whole numbers and decimals. Students use place value disks and a place value chart to build the place value chart from millions to thousandths. They compose and decompose units crossing the decimal with a view toward extending their knowledge of the *10 times as large* and *1/10 as large* relationships among whole number places to that of adjacent decimal places. This concrete experience is linked to the effects on the product when multiplying any number by a power of ten. For example, students notice that multiplying 0.4 by 1,000 shifts the position of the digits to the left three places, changing the digits' relationships to the decimal point and producing a product with a value that is 10 × 10 × 10 as large (400.0) (**5.NBT.2**). Students explain these changes in value and shifts in position in terms of place value. Additionally, students learn a new and more efficient way to represent place value units using exponents, e.g., 1 thousand = 1,000 = 103 (**5.NBT.2**). Conversions among metric units such as kilometers, meters, and centimeters give an opportunity to apply these extended place value relationships and exponents in a meaningful context by exploring word problems in the last lesson of Topic A (**5.MD.1**).

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 1

Objective: Reason concretely and pictorially using place value uderstanding to relate adjacent base ten units from millions to thousandths.

Homework Key

1. a. Answer provided
   b. 728.1
   c. 9254
   d. Explanations will vary.
2. a. Answer provided
   b. 6.78
   c. 0.067
   d. Explanations will vary.
3. 8,912,000
4. 2800.3
   a. $28.003 \times 100 = 2800.3$; explanations will vary.
5. 251 m; explanations will vary.

Lesson 1 (continued)

Homework Samples

1. Use the place value chart and arrows to show how the value of each digit changes. The first one has been done for you.

a. 4.582 × 10 = 45.82

				●			
			4		5	8	2
		4	5		8	2	

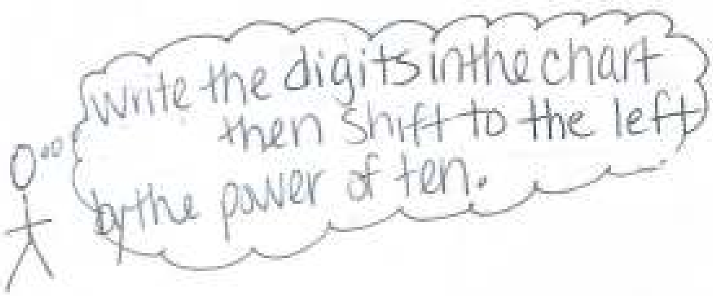
b. 7.281 × 100 = 728.1

				●			
			7	.	2	8	1
	7	2	8	.	1		

c. 9.254 × 1,000 = 9,254

				●			
			9		2	5	4
9	2	5	4	.			

d. Explain how and why the value of the 2 changed in (a), (b), and (c).



Example: The 2 in 4.582 was in the thousandths place when multiplied by 10, the value became 2 hundredths. It got 10 times bigger.

Lesson 1 (continued)

5. On a map, the perimeter of a park is 0.251 meters. The actual perimeter of the park is 1,000 times as large. What is the actual perimeter of the park? Explain how you know using a place value chart.

$$\begin{array}{r} 0.251 \\ \times 1{,}000 \\ \hline 251 \text{ meters.} \end{array}$$

Each digit shifts 3 places to the left because the number was multiplied by 1,000.

Lesson 2

Objective: Reason abstractly using place value understanding to relate adjacent base ten units from millions to thousandths.

Homework Key

1. a. 360,000
   b. 3,600
   c. 43
   d. 0.43
   e. 240
   f. 0.024
   g. 4,540
   h. 30.454
2. a. 145,600
   b. 1,456,000
   c. 14,560,000
   d. Explanations will vary.
3. 0.165
   0.0165
   Explanations will vary.
4. No; $0.3 \times 100 = 30$; explanations will vary.
5. $1{,}700{,}000 \div 10 = 170{,}000$ km^2; explanations will vary.

Homework Samples

1. Solve.

   a. $36{,}000 \times 10 =$ 360,000
   b. $36{,}000 \div 10 =$ 3600
   c. $4.3 \times 10 =$ 43
   d. $4.3 \div 10 =$ 0.43
   e. $2.4 \times 100 =$ 240
   f. $24 \div 1{,}000 =$ 0.024
   g. $4.54 \times 1{,}000 =$ 4,540
   h. $3{,}045.4 \div 100 =$ 30.454

4. Ted says that 3 tenths multiplied by 100 equals 300 thousandths. Is he correct? Use a place value chart to explain your answer.

No. If you multiply 3tenths by 100 the number will get bigger and the answer is 30.

Lesson 3

Objective: Use exponents to name place value units and explain patterns in the placement of the decimal point.

Homework Key

1. a. 10^3
   b. 10^2
   c. 10^5
   d. 10^3
   e. 10^6
   f. 10^5
2. a. 4,000
   b. 640,000
   c. 53
   d. 5,300
   e. 6,072
   f. 607,200
   g. 0.948
   h. 0.094
3. a. 2; 200; 2000
   b. 340; 0.034
   c. 85,700; 857; 0.857
   d. 444,000; 4,440,000; 44,400,000
   e. 0.095; 9,500,000; 950,000,000
4. Answers will vary; $10^4 = 10 \times 10 \times 10 \times 10 =$ 10,000
5. a. Answers will vary.
   b. $247 \div 10^3 = 0.247$; $247 \times 10^3 = 247{,}000$

Homework Samples

1. Write the following in exponential form (e.g., $100 = 10^2$).

a. $1000 =$ 10^3

b. $10 \times 10 =$ 10^2

c. $100{,}000 =$ 10^5

d. $100 \times 10 =$ 10^3

e. $1{,}000{,}000 =$ 10^6

f. $10{,}000 \times 10 =$ 10^5

3. Complete the patterns.

a. 0.02 0.2 2 20 200 2,000

b. 3,400,000 34,000 340 3.4 .034

Lesson 3 (continued)

4. After a lesson on exponents, Tia went home and said to her mom, "I learned that 10^4 is the same as 40,000." She has made a mistake in her thinking. Use words, numbers, or a place value chart to help Tia correct her mistake.

$10^4 = 10{,}000$

$4 \times 10^4 = 4 \times 10{,}000 = 40{,}000$

Tia Knows that 10^4 equals 10,000 but would need to multiply that by 4 to get 40,000.

Lesson 4

Objective: Use exponents to denote powers of 10 with application to metric conversions.

Homework Key

1. a. Answer provided.
   b. 108; 1.08; $108 \div 10^2$
   c. 2.49; 249; 2.49×10^2
   d. 50; 0.50; $50 \div 10^2$
   e. 6.3; 630; 6.3×10^2
   f. 7; 0.07; $7 \div 10^2$
   g. b, d, f
2. a. 4; 4000; 4×10^3
   b. 1.7; 1700; 1.7×10^3
   c. 1050; 1.050; $1050 \div 10^3$
   d. 65; 0.065; $65 \div 10^3$
   e. 4.92; 4920; 4.92×10^3
   f. 3; .003; $3 \div 10^3$
   g. a, b, c
3. a. 2638; answer provided.
   b. 0.07; $7 \div 10^2$
   c. 0.039; $39 \div 10^3$
   d. 80; 0.08×10^3
   e. 0.5; 0.005×10^2
4. 1.49 m = 1490 mm; $1.49 \div 10^3$
5. 2 cm = 0.02 m; $2 \div 10^2$
6. 77 mm = 0.077 m; $77 \div 10^3$

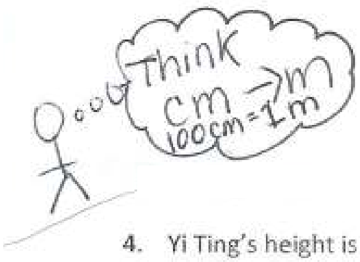
Lesson 4 (continued)

Homework Samples

1. Convert and write an equation with an exponent. Use your meter strip when it helps you.

a.	2 meters to centimeters	2m = 200 cm	$2 \times 10^2 = 200$
b.	108 centimeters to meters	108 cm = 1.08 m	$108 \div 10^2 = 1.08$
c.	2.49 meters to centimeters	2.49 m = 249 cm	$2.49 \times 10^2 = 249$
d.	50 centimeters to meters	50 cm = 0.5 m	$50 \div 10^2 = 0.5$
e.	6.3 meters to centimeters	6.3 m = 630 cm	$6.3 \times 10^2 = 630$
f.	7 centimeters to meters	7 cm = 0.07 m	$7 \div 10^2 = 0.07$

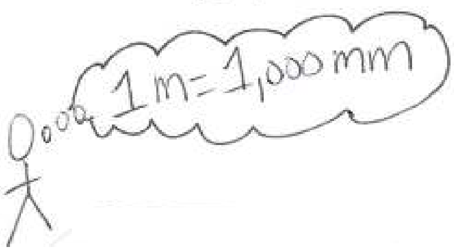
g. In the space below, list the letters of the problems where smaller units are converted to larger units.



B, D, F

4. Yi Ting's height is 1.49 m. Express this measurement in millimeters. Explain your thinking. Include an equation with an exponent in your explanation.

1.49 m = 1,490 mm



$1.49 \times 10^3 = 1{,}490$ mm

Grade 5 Module 1 Topic B

Decimal Fractions and Place Value Patterns

Focus Standard:

5.NBT.3 Read, write, and compare decimals to thousandths.
a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g.,
347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).
b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Instructional Days Recommended: 2

Naming decimal fractions in expanded, unit, and word forms in order to compare decimal fractions is the focus of Topic B (**5.NBT.3**). Familiar methods of expressing expanded form are used, but students are also encouraged to apply their knowledge of exponents to expanded forms (e.g., 4,300.01 = 4 × 103 + 3 × 102 + 1 × 1/100). Place value charts and disks offer a beginning for comparing decimal fractions to the thousandths, but are quickly supplanted by reasoning about the meaning of the digits in each place, noticing differences in the values of like units and expressing those comparisons with symbols (>, <, and =).

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 5

Objective: Name decimal fractions in expanded, unit, and word forms by applyig place value reasoning.

Homework Key

1. a. Answer provided.
   b. 0.035
   c. 9.235
   d. 800.005
   e. 0.008
   f. 0.028
   g. 7.528
   h. 300.502
2. a. Eight thousandths
   b. Fifteen and sixty-two thousandths
   c. Six hundred seven and four hundred nine thousandths
3. a. Answer provided.
   b. $3 \times 0.1 + 6 \times 0.01 + 2 \times 0.001$
   c. $4 \times 10 + 9 \times 1 + 5 \times 0.1 + 6 \times 0.01 + 4 \times 0.001$
4. a. 35.276
   b. 920.307
   c. 5,408.065
5. a. $4 \times 1 + 8 \times \frac{1}{10} + 7 \times \frac{1}{100} + 5 \times \frac{1}{1000}$
   b. $3 \times 1 + 1 \times \frac{1}{10} + 2 \times \frac{1}{100} + 5 \times \frac{1}{1000}$
6. Nancy: $4 \times 100 + 1 \times 10 + 2 \times 1 + 6 \times \frac{1}{10} + 3 \times \frac{1}{100} + 8 \times \frac{1}{1000}$
   Charles: $4 \times 100 + 1 \times 10 + 2 \times 1 + 6 \times 0.1 + 3 \times 0.01 + 8 \times 0.001$

Lesson 5 (continued)

Homework Samples

1. Express as decimal numerals. The first one is done for you.

Use a place value chart to help you.

a. Five thousandths	0.005
b. Thirty-five thousandths	0.035
c. Nine and two hundred thirty-five thousandths	9.235
d. Eight hundred and five thousandths	800.005
e. $\frac{8}{1000}$	0.008
f. $\frac{28}{1000}$	0.028
g. $7\frac{528}{1000}$	7.528
h. $300\frac{502}{1000}$	300.502

4. Write a decimal for each of the following. Use a place value chart to help, if necessary.

a. $3 \times 10 + 5 \times 1 + 2 \times \left(\frac{1}{10}\right) + 7 \times \left(\frac{1}{100}\right) + 6 \times \left(\frac{1}{1000}\right)$ 35.276

b. $9 \times 100 + 2 \times 10 + 3 \times 0.1 + 7 \times 0.001$

c. $5 \times 1000 + 4 \times 100 + 8 \times 1 + 6 \times \left(\frac{1}{100}\right) + 5 \times \left(\frac{1}{1000}\right)$

5. At the beginning of a lesson, a piece of chalk is 4.875 inches long. At the end of the lesson, it is 3.125 inches long. Write the two amounts in expanded form using fractions.

a. At the beginning of the lesson:

$(4 \times 1) + (8 \times \frac{1}{10}) + (7 \times \frac{1}{100}) + (5 \times \frac{1}{1,000})$

Lesson 6

Objective: Compare decimal fractions to the thousandths using like units, and express comparisons with >, <, =.

Homework Key

1. a. <
   b. =
   c. =
   d. <
   e. >
   f. =
   g. <
   h. >
   i. <
   j. <

2. a. 8.008; 8.08; 8.081; 8.09
   b. 14.200; 14.204; 14.210; 14.240
3. a. 8.58; 8.508; 7.5; 7.058
   b. 439.612; 439.261; 439.216; 439.126
4. James' hand was bigger; explanations will vary.
5. Salvador's plane traveled the farthest distance; Jennifer's plane traveled the shortest distance; explanations will vary.

Homework Samples

1. Use >, <, or = to compare the following.

a. 16.45	<	16.454
b. 0.83	=	$\frac{83}{100}$
c. $\frac{205}{1000}$ 0.205	=	0.205
d. 95.045	<	95.545
e. 419.10	>	419.099
f. Five ones and eight tenths 5.8	=	Fifty-eight tenths 5.8
g. Thirty-six and nine thousandths 36.009	<	Four tens 40
h. One hundred four and twelve hundredths 104.12	>	One hundred four and two thousandths 104.002
i. One hundred fifty-eight thousandths 0.158	<	0.58
j. 703.005	<	Seven hundred three and five hundredths 703.05

Write the numbers out.

Lesson 6 (continued)

4. James measured his hand. It was 0.17 meter. Jennifer measured her hand. It was 0.165 meter. Whose hand is bigger? How do you know?

James 0.17m
Jennifer 0.165m

James' hand is bigger. The digit in the tenths place is the same, the digits in the hundredths place, 7 & 6. 7 is bigg than 6.

Grade 5 Module 1 Topic C

Place Value and Rounding Decimals Fractions

Focus Standard:

5.NBT.4 Use place value understanding to round decimals to any place.

Instructional Days Recommended: 2

In Topic C, students generalize their knowledge of rounding whole numbers to round decimal numbers to any place. In Grades 3 and 4, vertical number lines provided a platform for students to round whole numbers to any place. In Grade 5, vertical number lines again provide support for students to make use of patterns in the base ten system allowing knowledge of whole number rounding (**4.NBT.3**) to be easily applied to rounding decimal values (**5.NBT.4**). The vertical number line is used initially to find more than or less than halfway between multiples of decimal units. In these lessons, students are encouraged to reason more abstractly as they use place value understanding to approximate by using nearest multiples. Naming those nearest multiples is an application of flexibly naming decimals using like place value units. To round 3.85 to the nearest tenth, students find the nearest multiples, 3.80 (38 tenths 0 hundredths) and 3.9 (39 tenths 0 hundredths), and then decide that 3.85 (38 tenths 5 hundredths) is exactly halfway between and, therefore, must be rounded up to 3.9.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 7 - 8

Objective: Round a given decimal to any place using place value understanding and the vertical number line.

Homework Key (7)

1. a. 430 hundredths = 4.3
   b. 43 tenths = 4.3
   c. 4 ones = 4
2. a. 22,529 hundredths = 225.29
   b. 225 ones = 225
   c. 23 tens = 230
3. a. 898 hundredths = 8.98
   b. 90 tenths = 9.0
   c. 9 ones = 9
   d. 1 ten = 10
4. a. 18.39 m
   b. 1,838.6 cm
5. Explanations will vary.

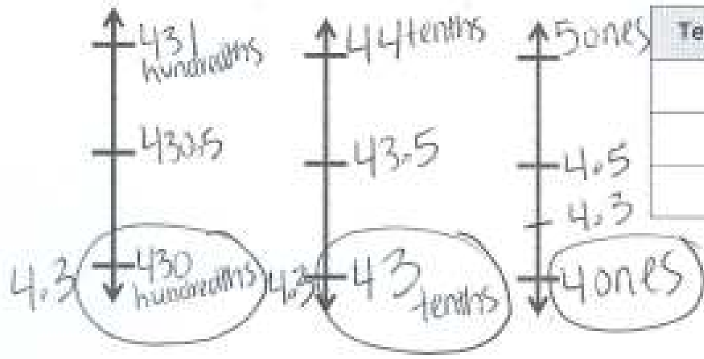
Lesson 7 (continued)

Homework Samples

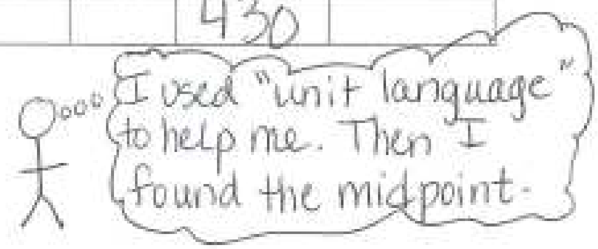
Fill in the table, and then round to the given place. Label the number lines to show your work. Circle the rounded number.

1. 4.3

a. Hundredths b. Tenths c. Ones



Tens	Ones	Tenths	Hundredths	Thousandths
	4	3		
		43		
			430	



4. On a Major League Baseball diamond, the distance from the pitcher's mound to home plate is 18.386 meters.

a. Round this number to the nearest hundredth of ~~a meter. Use a number line to show your work.~~

18.386 meters

18.386 ≈ 18.39 meters

b. How many centimeters is it from the pitcher's mound to home plate?

1,838.6 cm

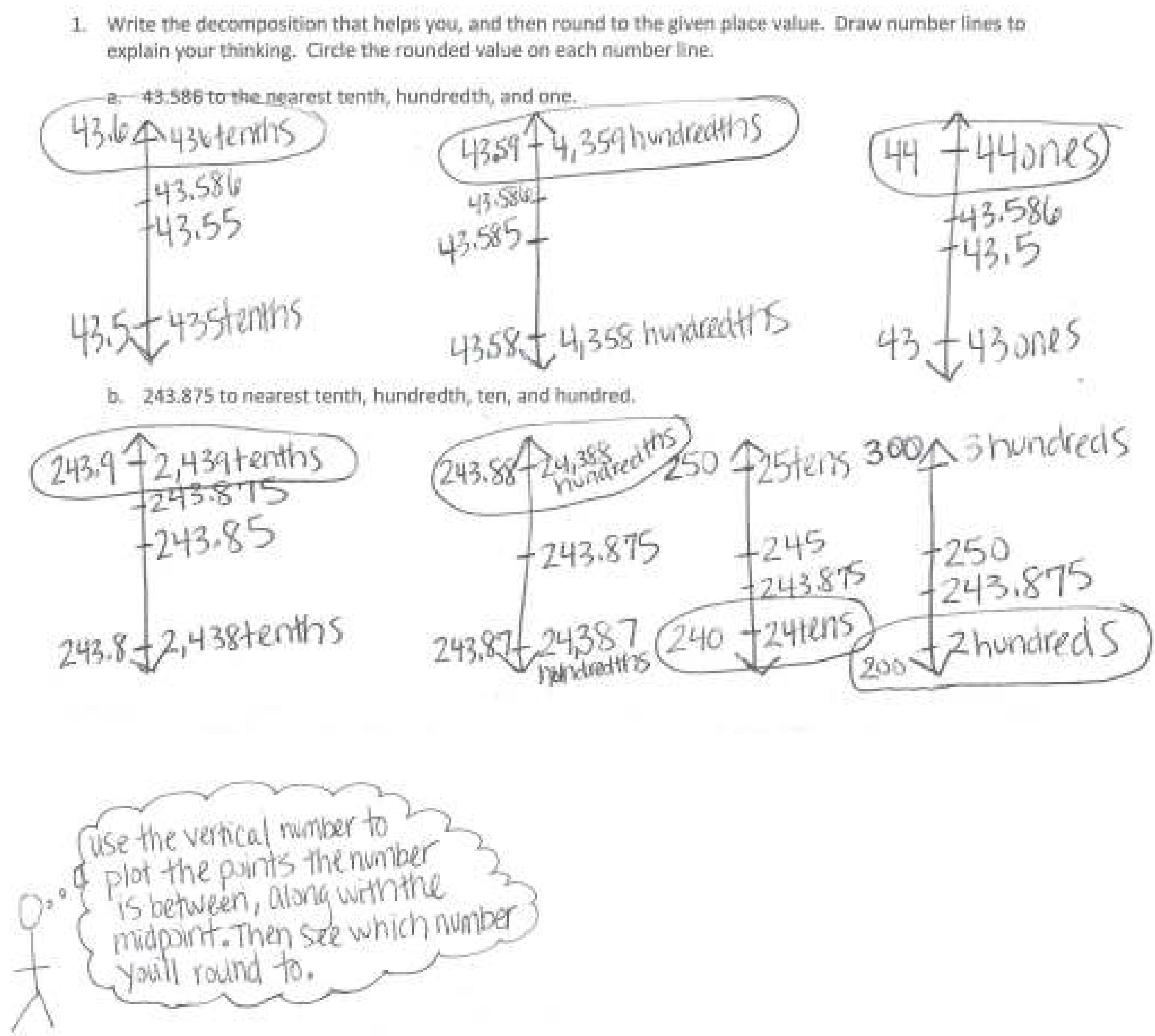
1m = 100cm

Lesson 8

Homework Key

1. a. 43.6; 43.59; 44
   b. 243.9; 243.88; 240; 200
2. 285.2 miles
3. a. 18.64; explanations will vary.
   b. 18.55; explanations will vary.

Homework Samples


1. Write the decomposition that helps you, and then round to the given place value. Draw number lines to explain your thinking. Circle the rounded value on each number line.

a. 43.586 to the nearest tenth, hundredth, and one.

b. 243.875 to nearest tenth, hundredth, ten, and hundred.

Grade 5 Module 1 Topic D

Adding and Subtracting Decimals

Focus Standards:

5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

5.NBT.3 Read, write, and compare decimals to thousandths.

a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.

b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Instructional Days Recommended: 2

Topics D through F mark a shift from the opening topics of Module 1. From this point to the conclusion of the module, students begin to use base ten understanding of adjacent units and whole number algorithms to reason about and perform decimal fraction operations—addition and subtraction in Topic D, multiplication in Topic E, and division in Topic F (**5.NBT.7**).

In Topic D, unit form provides the connection that allows students to use what they know about general methods for addition and subtraction with whole numbers to reason about decimal addition and subtraction (e.g., 7 tens + 8 tens = 15 tens = 150 is analogous to 7 tenths + 8 tenths = 15 tenths = 1.5). Place value charts and disks (both concrete and pictorial representations) and the relationship between addition and subtraction are used to provide a bridge for relating such understandings to a written method. Real world contexts provide opportunities for students to apply their knowledge of decimal addition and subtraction as well in Topic D.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 9

Objective: Add decimals using place value strategies and relate those strategies to a written method.

Homework Key

1.
   a. 7
   b. 21; 2; 1
   c. 7
   d. 34; 3; 4
   e. 7
   f. 44; 4; 4
   g. 507
   h. 48
   i. 6,016

2.
   a. 1.1
   b. 2.11
   c. 10.1
   d. 59.11
   e. 77.701
   f. 97.900

3.
   a. 4,133 km
   b. 4.126 km

4. $12.86

Homework Samples

1. Solve.

   a. 3 tenths + 4 tenths = 7 tenths
   b. 12 tenths + 9 tenths = 21 tenths = 2 one(s) 1 tenth(s)
   c. 3 hundredths + 4 hundredths = 7 hundredths
   d. 27 hundredths + 7 hundredths = 34 hundredths = 3 tenths 4 hundredths
   e. 4 thousandths + 3 thousandths = 7 thousandths
   f. 39 thousandths + 5 thousandths = 44 thousandths = 4 hundredths 4 thousandths
   g. 5 tenths + 7 thousandths = 507 thousandths
   h. 4 ones 4 tenths + 4 tenths = 48 tenths
   i. 8 thousandths + 6 ones 8 thousandths = 6,016 thousandths

Lesson 9 (continued)

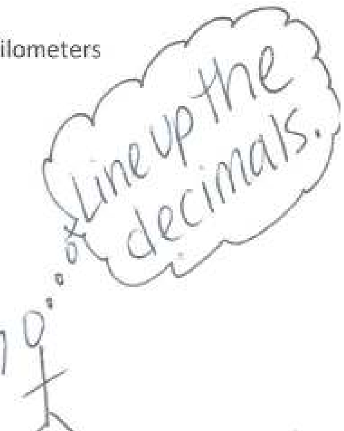
3. Walkway Over the Hudson, a bridge that crosses the Hudson River in Poughkeepsie, is 2.063 kilometers long. Anping Bridge, which was built in China 850 years ago, is 2.07 kilometers long.

   a. What is the total span of both bridges? Show your thinking.

Hudson $\boxed{2.063 \text{ Km}}$

Anping $\boxed{2.07 \text{ Km}}$

$$\begin{array}{r} 2.063 \\ +\,2.07 \\ \hline 4.133 \text{ Km} \end{array}$$



   b. Leah likes to walk her dog on the Walkway Over the Hudson. If she walks across and back, how far will she and her dog walk?

Hudson + Hudson

2.063 + 2.063

4.126 Km

$$\begin{array}{r} 2.063 \\ +\,2.063 \\ \hline 4.126 \end{array}$$

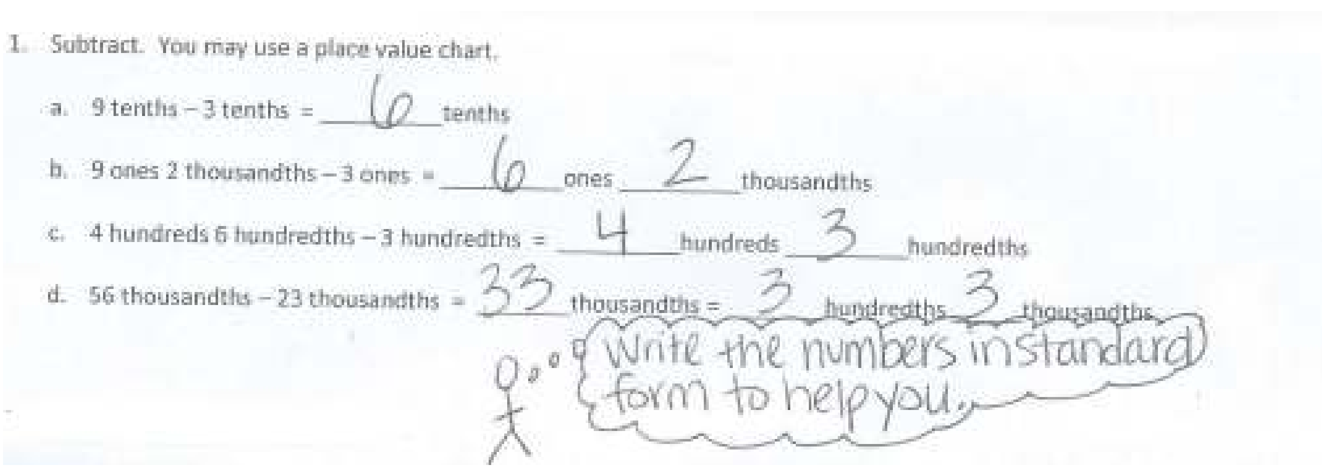
Lesson 10

Objective: Subtract decimals using place value strategies and relate those strategies to a written method.

Homework Key

1. a. 6
   b. 6; 2
   c. 4; 3
   d. 33; 3; 3
2. a. 0.9
   b. 40.94
   c. 319.92
   d. 5.092
   e. 46.166
   f. 737.09
3. a. 269.7
   b. 3.4
   c. 1.1
   d. 3.77
   e. 8.196
   f. 4.77
4. No; explanations will vary; 0.75
5. $3.89

Homework Samples


1. Subtract. You may use a place value chart.

a. 9 tenths – 3 tenths = 6 tenths

b. 9 ones 2 thousandths – 3 ones = 6 ones 2 thousandths

c. 4 hundreds 6 hundredths – 3 hundredths = 4 hundreds 3 hundredths

d. 56 thousandths – 23 thousandths = 33 thousandths = 3 hundredths 3 thousandths

Write the numbers in standard form to help you.

Lesson 10 (continued)

5. A clipboard costs \$2.23. It costs \$0.58 more than a notebook. Lisa bought two clipboards and one notebook. She paid with a ten dollar bill. How much change does Lisa get? Use a tape diagram to show your thinking.

Clipboard | \$2.23 | \$2.23 |

Notebook | \$2.23 − \$0.58 = | 1.65

Total for 2 clipboards & 1 notebook

2 clipboards

$$\begin{array}{r} 2.23 \\ +2.23 \\ \hline \$4.46 \end{array}$$

Notebook

$$\begin{array}{r} 2.23 \\ -0.58 \\ \hline \$1.65 \end{array}$$

$$\begin{array}{r} \$4.46 \\ +\$1.65 \\ \hline \$6.11 \end{array}$$

$$\begin{array}{r} \cancel{10.00} \\ -6.11 \\ \hline \$3.89 \end{array}$$

Lisa will get \$3.89 change.

Grade 5 Module 1 Topic E

Multiplying Decimals

Focus Standards:

5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

5.NBT.3 Read, write, and compare decimals to thousandths.

a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).

b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Instructional Days Recommended: 2

A focus on reasoning about the multiplication of a decimal fraction by a one-digit whole number in Topic E provides the link that connects Grade 4 multiplication work and Grade 5 fluency with multi-digit multiplication. Place value understanding of whole number multiplication coupled with an area model of the distributive property is used to help students build direct parallels between whole number products and the products of one-digit multipliers and decimals (**5.NBT.7**). Once the decimal has been placed, students use an estimation-based strategy to confirm the reasonableness of the product through place value reasoning. Word problems provide a context within which students can reason about products.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

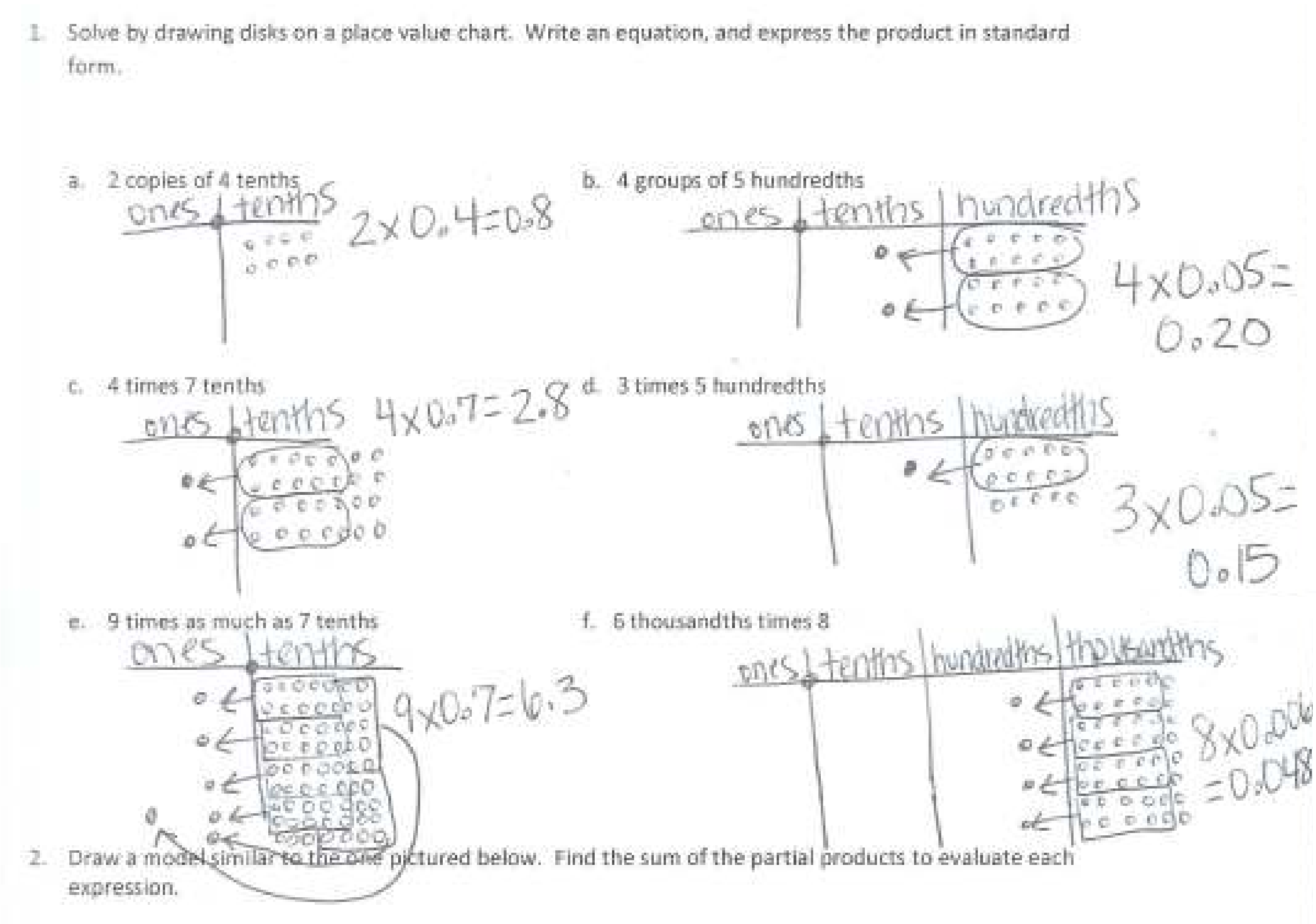
Lesson 11

Objective: Multiply a decimal fraction by single-digit whole numbers, relate to a written method through application of the area model and place value understanding, and explain the reasoning used.

Homework Key

1.
   a. $2 \times 0.4 = 0.8$
   b. $4 \times 0.05 = 0.2$
   c. $4 \times 0.7 = 2.8$
   d. $3 \times 0.05 = 0.15$
   e. $9 \times 0.7 = 6.3$
   f. $8 \times 0.006 = 0.048$
2.
   a. 24 ones; 28 tenths; 36 hundredths; 27.16
   b. $6 \times 7.49 = 44.94$
   c. $9 \times 3.65 = 32.85$
   d. $3 \times 20.175 = 60.525$
3. No; area models will vary; 34.4
4. $16.39

Homework Samples


1. Solve by drawing disks on a place value chart. Write an equation, and express the product in standard form.

a. 2 copies of 4 tenths

ones | tenths

$2 \times 0.4 = 0.8$

b. 4 groups of 5 hundredths

ones | tenths | hundredths

$4 \times 0.05 = 0.20$

c. 4 times 7 tenths

ones | tenths

$4 \times 0.7 = 2.8$

d. 3 times 5 hundredths

ones | tenths | hundredths

$3 \times 0.05 = 0.15$

e. 9 times as much as 7 tenths

ones | tenths

$9 \times 0.7 = 6.3$

f. 6 thousandths times 8

ones | tenths | hundredths | thousandths

$8 \times 0.006 = 0.048$

2. Draw a model similar to the one pictured below. Find the sum of the partial products to evaluate each expression.

Lesson 11 (continued)

3. Leanne multiplied 8 × 4.3 and got 32.24. Is Leanne correct? Use an area model to explain your answer.

	4ones	3tenths
8	8x4ones 32ones	8x3tenths 24 tenths

$32 + 2.4 = 34.4$

Leanne is not correct. The answer is 34.4.

Lesson 12

Objective: Multiply a decimal fraction by single-digit whole numbers, including using estimation to confirm the placement of the decimal point.

Homework Key

1. a. Circle 6.3; answers will vary.
   b. Circle 25.62; answers will vary.
   c. Circle 42.371; answers will vary.
   d. Circle 43.38; answers will vary.
2. 33.2 kg
3. \$128.49
4. \$50.64

Homework Samples

1. Choose the reasonable product for each expression. Explain your thinking in the spaces below using words, pictures, or numbers.

a. 2.1 × 3   0.63   6.3   63   630

21 tenths x 3 is 63 tenths. 63 tenths is 6.3.

b. 4.27 × 6   2562   256.2   25.62   2.562

I know the product has to be 4x6 plus some more. 4x6=24 so the answer has to be 25.62.

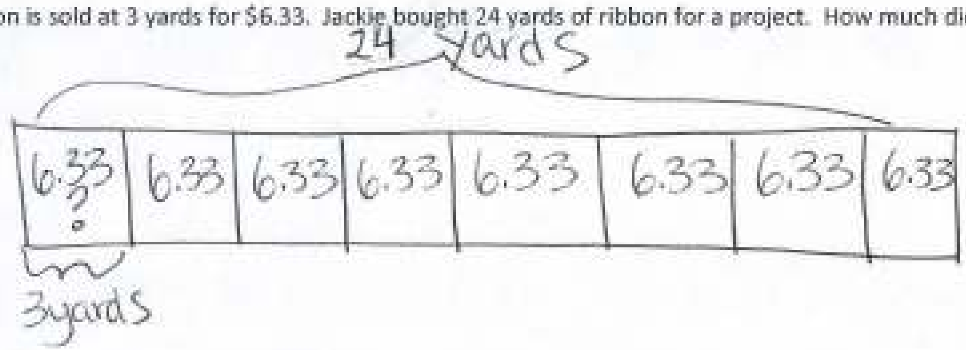
c. 7 × 6.053   4237.1   423.71   42.371   4.2371

I Know 7x6=42 so 7x6.053 is going to be close to 42.

d. 9 × 4.82   4.338   43.38   433.8   4338

I rounded 4.82 to 5. 9x5=45 so the answer 43.38 is closest to 45.

4. Ribbon is sold at 3 yards for $6.33. Jackie bought 24 yards of ribbon for a project. How much did she pay?



$6.33 x 8

$$\begin{array}{r} 6.33 \\ \times \quad 8 \\ \hline \$50.64 \end{array}$$

Jackie spent $50.64 for 24 yards of ribbon.

Grade 5 Module 1 Topic F

Dividing Decimals

Focus Standards:

5.NBT.3 Read, write, and compare decimals to thousandths.

a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.

b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Instructional Days Recommended: 4

Topic F concludes Module 1 with an exploration of division of decimal numbers by one-digit whole number divisors using place value charts and disks. Lessons begin with easily identifiable multiples such as $4.2 \div 6$ and move to quotients which have a remainder in the smallest unit (through the thousandths). Written methods for decimal cases are related to place value strategies, properties of operations, and familiar written methods for whole numbers (**5.NBT.7**). Students solidify their skills with an understanding of the algorithm before moving on to division involving two-digit divisors in Module 2. Students apply their accumulated knowledge of decimal operations to solve word problems at the close of the module.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 13

Objective: Divide decimals by single-digit whole numbers involving easily identifiable multiples using place value understanding and relate to a written method.

Homework Key

1. a. 5; 0.5
   b. 4; 0.04
   c. 9; 0.009
2. a. 9; 36; 3; 12; 3.12
   b. 36; 12; 12; 4; 12.004
   c. 35; 5; 7 tenths + 1 hundredth; 0.71
   d. 35 tenths ÷ 5 + 45 thousandths ÷ 5; 7 tenths+ 9 thousandths; 0.709
3. a. 3; 0.3
   b. 6; 0.006
4. a. No; explanations will vary; 0.09
   b. Yes; explanations will vary.
   c. No; explanations will vary; 9
5. $1.21
6. 6.32 L

Homework Samples

1. Complete the sentences with the correct number of units, and then complete the equation.

   a. 3 groups of __5__ tenths is 1.5. 1.5 ÷ 3 = __0.5__

   b. 6 groups of __4__ hundredths is 0.24. 0.24 ÷ 6 = __0.04__

   c. 5 groups of __9__ thousandths is 0.045. 0.045 ÷ 5 = __0.009__

Use your basic ⊗ facts to help solve.

2. Complete the number sentence. Express the quotient in units and then in standard form.

   a. 9.36 ÷ 3 = __9__ ones ÷ 3 + __36__ hundredths ÷ 3
   = __3__ ones + __12__ hundredths
   = __3.12__

Lesson 13 (continued)

4. Are the quotients below reasonable? Explain your answers.

a. $0.54 \div 6 = 9$

No, the dividend less than 1. If that is divided into 6 parts, the answer must be less than a whole.

b. $5.4 \div 6 = 0.9$

Yes, 54 tenths ÷ 6 = 9 tenths. Also you could think of it as about 6 ÷ 6 would be about 1 and 9 tenths is close to 1.

c. $54 \div 6 = 0.09$

No, 54 ÷ 6 = 9.

Lesson 14

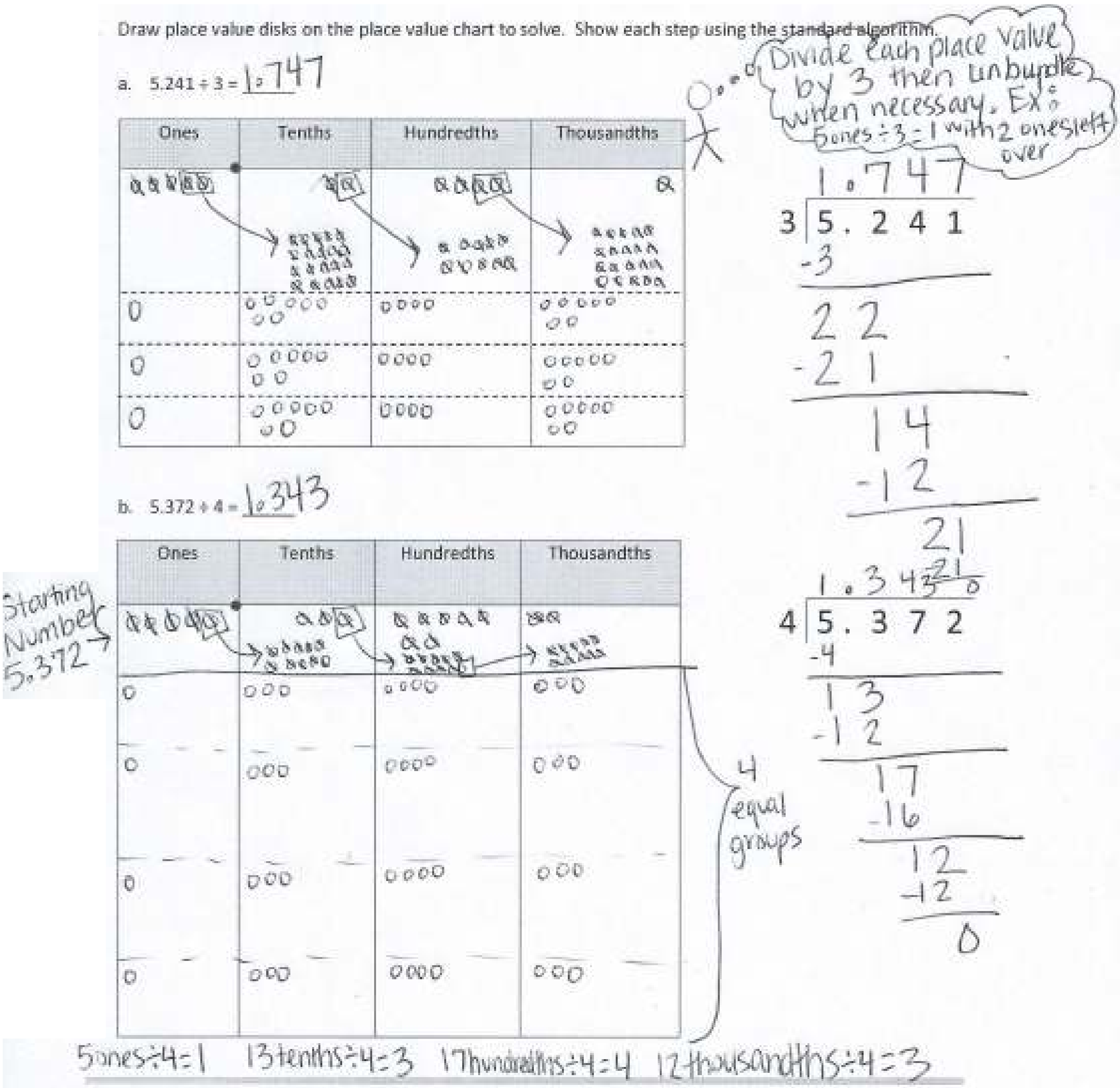
Objective: Divide decimals with a remainder using place value understanding and relate to a written method.

Homework Key

1. a. 1.747
   b. 1.343
2. a. 0.16
   b. 1.29
   c. 2.734
3. $13.56
4. 0.4 lb

Lesson 14 (continued)

Homework Samples



Draw place value disks on the place value chart to solve. Show each step using the standard algorithm.

a. 5.241 ÷ 3 = 1.747

Divide each place value by 3 then unbundle when necessary. Ex: 5 ones ÷ 3 = 1 with 2 ones left over

Ones	Tenths	Hundredths	Thousandths

$$\begin{array}{r} 1.747 \\ 3\,\overline{)\,5.241} \\ -3 \\ \hline 22 \\ -21 \\ \hline 14 \\ -12 \\ \hline 21 \\ -21 \\ \hline 0 \end{array}$$

b. 5.372 ÷ 4 = 1.343

Starting Number 5.372

Ones	Tenths	Hundredths	Thousandths

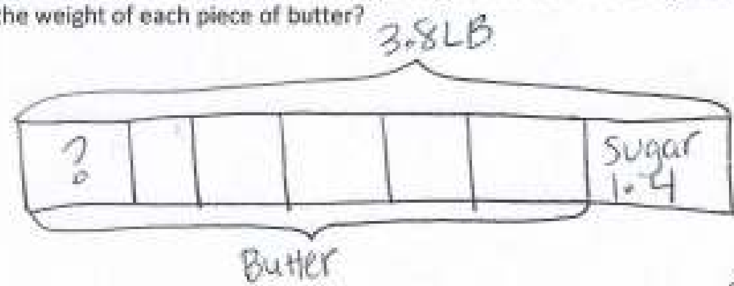
4 equal groups

$$\begin{array}{r} 1.343 \\ 4\,\overline{)\,5.372} \\ -4 \\ \hline 13 \\ -12 \\ \hline 17 \\ -16 \\ \hline 12 \\ -12 \\ \hline 0 \end{array}$$

5 ones ÷ 4 = 1   13 tenths ÷ 4 = 3   17 hundredths ÷ 4 = 4   12 thousandths ÷ 4 = 3

Lesson 14 (continued)

4. The total weight of 6 pieces of butter and a bag of sugar is 3.8 lb. If the weight of the bag of sugar is 1.4 lb, what is the weight of each piece of butter?



$$\begin{array}{r} 3.8 \\ -\,1.4 \\ \hline 2.4 \end{array}$$

$2.4 \div 6 = 0.4$ LB

Lesson 15

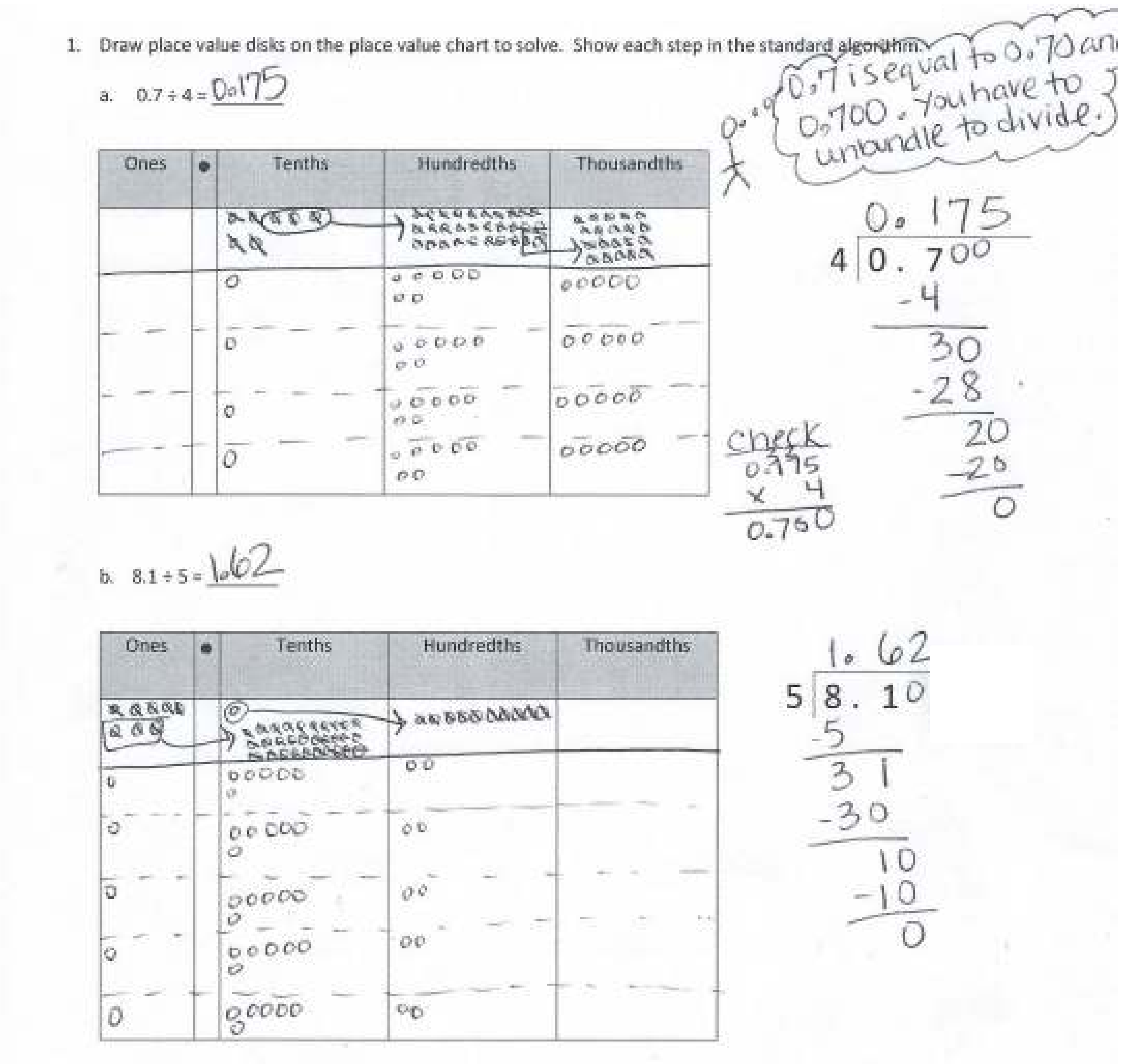
Objective: Divide decimals using place value understanding including remainders in the smallest unit.

Homework Key

1. a. 0.175
   b. 1.62
2. a. 0.35
   b. 0.65
   c. 2.25
   d. 0.46
   e. 2.35
   f. 11.375
3. 1.74 m
4. 1.425 gal

Lesson 15 (continued)

Homework Samples



1. Draw place value disks on the place value chart to solve. Show each step in the standard algorithm.

a. 0.7 ÷ 4 = 0.175

0.7 is equal to 0.70 and 0.700. You have to unbundle to divide.

Ones	•	Tenths	Hundredths	Thousandths

$$
\begin{array}{r}
0.175 \\
4\,\overline{)\,0.700} \\
-4 \\
\hline
30 \\
-28 \\
\hline
20 \\
-20 \\
\hline
0
\end{array}
$$

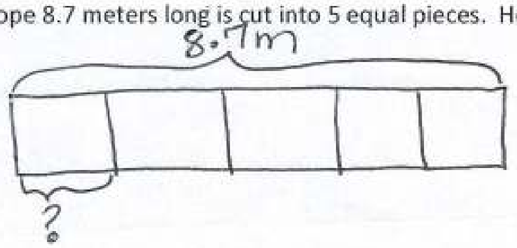
Check
$0.175 \times 4 = 0.700$

b. 8.1 ÷ 5 = 1.62

Ones	•	Tenths	Hundredths	Thousandths

$$
\begin{array}{r}
1.62 \\
5\,\overline{)\,8.10} \\
-5 \\
\hline
31 \\
-30 \\
\hline
10 \\
-10 \\
\hline
0
\end{array}
$$

3. A rope 8.7 meters long is cut into 5 equal pieces. How long is each piece?



$$5\overline{)8.70} = 1.74$$
-5, 37, -35, 20, -20, 0

Each piece is 1.74 meters long.

Lesson 16

Objective: Solve word problems using decimal operations.

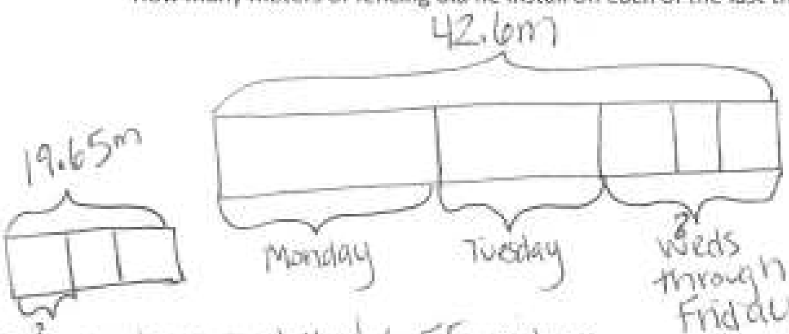
Homework Key

1. 6.55 m
2. a. $127.05
   b. $1,172.95
3. 9.73 lb
4. 0.744 L

Homework Samples

Solve using tape diagrams.

1. A gardener installed 42.6 meters of fencing in a week. He installed 13.45 meters on Monday and 9.5 meters on Tuesday. He installed the rest of the fence in equal lengths on Wednesday through Friday. How many meters of fencing did he install on each of the last three days?



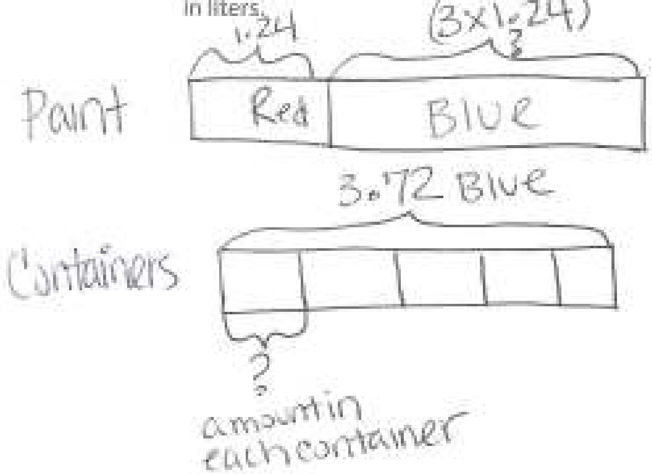
42.60 (Total)
− 13.45 (Monday)
29.15
− 9.50 (Tuesday)
19.65 (weds → Friday)

$$3\overline{)19.65} = 6.55$$
-18, 16, -15, 15, -15, 0

The gardener installed 6.55 meters on each of the last 3 days.

Lesson 16 (continued)

4. Mrs. Cleaver mixes 1.24 liters of red paint with 3 times as much blue paint to make purple paint. She pours the paint equally into 5 containers. How much blue paint is in each container? Give your answer in liters.



$$\begin{array}{r} 1.24 \\ \times\ \ 3 \\ \hline 3.72 \end{array}$$ Blue

$$\begin{array}{r} 0.744 \\ 5\overline{)3.720} \\ -3\,5 \\ \hline 22 \\ -20 \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$

Each container has 0.744 liters of blue paint in it.