

Kenmore-Town of Tonawanda UFSD

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



Grade 5 Module 2 Parent Handbook

Multiplying and Dividing Whole Numbers and Decimals

In this module, we will be building up our knowledge of first multiplication and then division. We will start with whole numbers and then move to decimals as we practice different ways to model these operations.

Thinking mathematically is hard but important work!



Key Words to Know

Decimal: A fraction whose denominator is a power of ten

Decimal Fraction: A proper fraction whose denominator is a power of ten

Equation: A statement that the values of two expressions are equal

Estimate: Approximation of the value of a quantity or number

Product: The result of a multiplication

Quotient: The result of dividing one quantity by another

Remainder: The number left over when one integer is divided by another

Unit Form: Place value counting, e.g., 34 is stated as 3 tens 4 ones

Sample area model of multiplication for 64×73 :

	70	+	3
4	280		12
+			
60	4200		180

What Came Before this Module: We worked very hard to understand the values of numbers on the place value chart.

What Comes After this Module: We will begin work with the base-10 place value system

+ How you can help at home:

- Become familiar with the area model, a different method of multiplying than you may have learned
- Continue to review the place value system with your student
- Discuss mathematical patterns, such as 5×9 , 5×90 , 50×90 , 50×900 , etc.

Key Common Core Standards:

- *Write and interpret numerical expressions, e.g., “Add 8 and 7, then multiply by 2” is represented as $2 \times (8 + 7)$*
- *Perform operations with multi-digit whole numbers and with decimals to the hundredths, e.g., 46×72 , 3.1*
- *Convert like measurement units within a given measurement system, e.g., 5 cm is 0.05 m*



Spotlight on Math Models:

Tape Diagrams

You will often see this mathematical representation in *A Story of Units*.

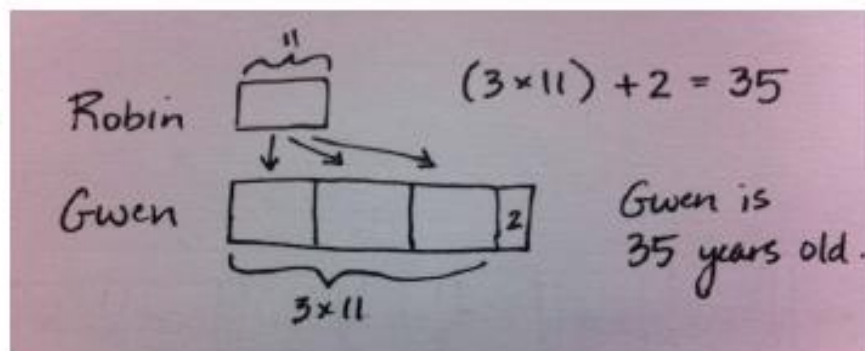
A Story of Units has several key mathematical “models” that will be used throughout a student’s elementary years.

The tape diagram is a powerful model that students can use to solve various kinds of problems. In second grade, you will often see this model as an aid to addition and subtraction problems. Tape diagrams are also called “bar models” and consist of a simple bar drawing that students make and adjust to fit a word problem. They then use the drawing to discuss and solve the problem.

As students move through the grades, tape diagrams provide an essential bridge to algebra. Below is a sample word problem from Module 2 solved using a tape diagram to show the parts of the problem.

Sample Problem from Module 2:
(Example taken from Lesson 3, Module 2)

Robin is 11 years old. Her mother, Gwen, is 2 years more than 3 times Robin’s age. How old is Gwen?



Multi-Digit Whole Number and Decimal Fraction Operations

OVERVIEW

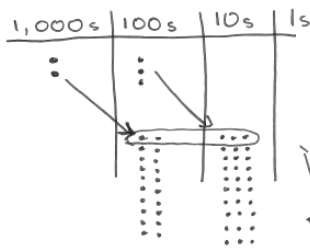
In Module 1, students explored the relationships of adjacent units on the place value chart to generalize whole number algorithms to decimal fraction operations. In Module 2, students apply the patterns of the base ten system to mental strategies and the multiplication and division algorithms.

Topics A through D provide a sequential study of multiplication. To link to prior learning and set the foundation for understanding the standard multiplication algorithm, students begin at the concrete–pictorial level in Topic A. They use place value disks to model multi-digit multiplication of place value units, e.g., 42×10 , 42×100 , $42 \times 1,000$, leading to problems such as 42×30 , 42×300 and $42 \times 3,000$ (**5.NBT.1**, **5.NBT.2**). They then round factors in Lesson 2 and discuss the reasonableness of their products. Throughout Topic A, students evaluate and write simple expressions to record their calculations using the associative property and parentheses to record the relevant order of calculations (**5.OA.1**).

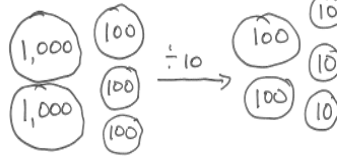
In Topic B, place value understanding moves toward understanding the distributive property via area models which are used to generate and record the partial products (**5.OA.1**, **5.OA.2**) of the standard algorithm (**5.NBT.5**). Topic C moves students from whole numbers to multiplication with decimals, again using place value as a guide to reason and make estimations about products (**5.NBT.7**). In Topic D, students explore multiplication as a method for expressing equivalent measures. For example, they multiply to convert between meters and centimeters or ounces and cups with measurements in both whole number and decimal form (**5.MD.1**).

Topics E through H provide a similar sequence for division. Topic E begins concretely with place value disks as an introduction to division with multi-digit whole numbers (**5.NBT.6**).

$$2,300 \div 10$$



I decompose each unit into 10 of the next smaller unit and divide by 10! $2,300 \div 10 = 230$



It's quicker to draw with just disks. Each unit is divided by 10. So $1,000 \rightarrow 100$ and $100 \rightarrow 10$.

In the same lesson, $420 \div 60$ is interpreted as $420 \div 10 \div 6$. Next, students round dividends and two-digit divisors to nearby multiples of 10 in order to estimate single-digit quotients (e.g., $431 \div 58 \approx 420 \div 60 = 7$) and then multi-digit quotients. This work is done horizontally, outside the context of the written vertical method. The series of lessons in Topic F leads students to divide multi-digit dividends by two-digit divisors using the written vertical method. Each lesson moves to a new level of difficulty with a sequence beginning with divisors that are multiples of 10 to non-multiples of 10. Two instructional days are devoted to single-digit quotients with and without remainders before progressing to two- and three-digit quotients (**5.NBT.6**).

In Topic G, students use their understanding to divide decimals by two-digit divisors in a sequence similar to that of Topic F with whole numbers (**5.NBT.7**). In Topic H, students apply the work of the module to solve multi-step word problems using multi-digit division with unknowns representing either the group size or number of groups. In this topic, an emphasis on checking the reasonableness of their answers draws on skills learned throughout the module, including refining their knowledge of place value, rounding, and estimation.

Terminology

New or Recently Introduced Terms

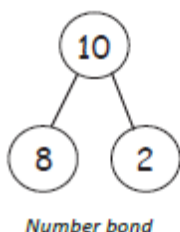
- Conversion factor (the factor in a multiplication sentence that renames one measurement unit as another equivalent unit, e.g., $14 \times (1 \text{ in}) = 14 \times (\frac{1}{12} \text{ ft})$; 1 in and $\frac{1}{12}$ ft are the conversion factors.)
- Decimal Fraction (a proper fraction whose denominator is a power of 10)
- Multiplier (a quantity by which a given number—a multiplicand—is to be multiplied)
- Parentheses (the symbols used to relate order of operations)

Familiar Terms and Symbols

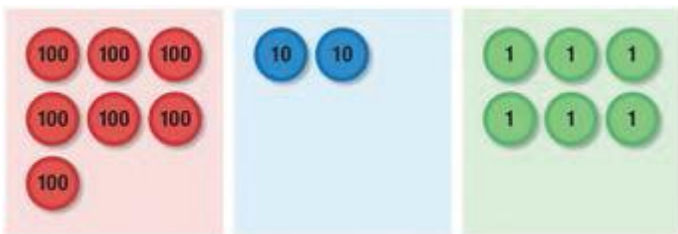
- Decimal (a fraction whose denominator is a power of ten and whose numerator is expressed by figures placed to the right of a decimal point)
- Digit (a symbol used to make numbers: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9)
- Divisor (the number by which another number is divided)
- Equation (a statement that the values of two mathematical expressions are equal)
- Equivalence (a state of being equal or equivalent)
- Equivalent measures (e.g., 12 inches = 1 foot; 16 ounces = 1 pound)
- Estimate (approximation of the value of a quantity or number)
- Exponent (the number of times a number is to be used as a factor in a multiplication expression)
- Multiple (a number that can be divided by another number without a remainder like 15, 20, or any multiple of 5)
- Pattern (a systematically consistent and recurring trait within a sequence)
- Product (the result of multiplying numbers together)
- Quotient (the answer of dividing one quantity by another)
- Remainder (the number left over when one integer is divided by another)
- Renaming (decomposing or composing a number or units within a number)
- Rounding (approximating the value of a given number)
- Unit Form (place value counting, e.g., 34 stated as 3 tens 4 ones)

Suggested Tools and Representations

- Area models (e.g., an array)
- Number bond



- Place value disks



Unit form modeled with place value disks:
7 hundreds 2 tens 6 ones = 72 tens 6 ones = 726 ones

- Partial product (an algorithmic method that takes base ten decompositions of factors, makes products of all pairs, and adds all products together)
- Partial quotient (an algorithmic method using successive approximation)

Grade 5 Module 2 Topic A

Mental Strategies for Multi-Digit Whole Number Multiplication

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 $\frac{1}{10}$ 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 power of 10.

Instructional Days Recommended: 2

Topic A begins a sequential study of multiplication that culminates in Topic D. In order to link prior learning from Grade 4 and Grade 5's Module 1 and to set the stage for solidifying the standard multiplication algorithm, students begin at the concrete–pictorial level. They use place value disks to model multi-digit multiplication of place value units, e.g., 42×10 , 42×100 , $42 \times 1,000$, leading quickly to problems such as 42×30 , 42×300 , and $42 \times 3,000$ (**5.NBT.1**, **5.NBT.2**). Students then round factors in Lesson 2, and discuss the reasonableness of their products. Throughout Topic A, students evaluate and write simple expressions to record their calculations using the associative property and parentheses to record the relevant order of calculations (**5.OA.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: Multiply multi-digit whole numbers and multiples of 10 using place value patterns and the distributive and associative properties.

Homework Key

- 129; 1,290
 - 129; 12,900
 - Hundreds; 16,600
 - 44; 4; ten thousands; 1,760,000
 - 8; 5; ten thousands; 400,000
- True; answers will vary.
 - False; answers will vary.
 - True; answers will vary.
 - False; answers will vary.
- Answers provided
 - 400; 4,000; 400,000; 400,000
 - 1,911; 191,100; 1,911,000; 19,110,000
- 600 in²
- 2,115,000

Homework Samples

- Fill in the blanks using your knowledge of place value units and basic facts.

a. 43×30

Think: 43 ones \times 3 tens = 129 tens

$43 \times 30 = \underline{1,290}$

b. 430×30

Think: 43 tens \times 3 tens = 129 hundreds

$430 \times 30 = \underline{12,900}$

c. 830×20

Think: 83 tens \times 2 tens = 166 hundreds

$830 \times 20 = \underline{16,600}$

d. $4,400 \times 400$

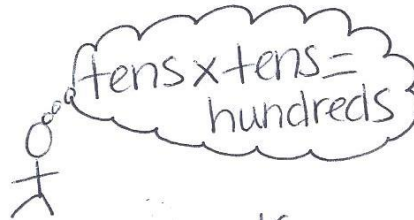
44 hundreds \times 4 hundreds = 176 ten thousands

$4,400 \times 400 = \underline{1,760,000}$

e. $80 \times 5,000$

8 tens \times 5 thousands = 40 ten thousands

$80 \times 5,000 = \underline{400,000}$



- Determine if these equations are true or false. Defend your answer using your knowledge of place value and the commutative, associative, and/or distributive properties.

a. 35 hundreds = 5 tens \times 7 tens

True.

$3,500 = 50 \times 70$

$35 \text{ hundreds} = 35 \times 100$



Lesson 2

Objective: Estimate multi-digit products by rounding factors to a basic fact and using place value patterns.

Homework Key

1.
 - a. 700; 80; 56,000; 56,000
 - b. 6,000; 70; 420,000; 420,000
 - c. 9,000; 50; 450,000; 450,000
2.
 - a. Answers provided
 - b. $80,000 \times 200$; 16,000,000
 - c. $10,000 \times 40$; 400,000
 - d. $1,000 \times 400$; 400,000
 - e. $90,000 \times 900$; 81,000,000
3. $8,146 \times 121$; explanations will vary.
4.
 - a. 800; 30
 - b. 600; 700
 - c. 8,000; 500
5. 3,200,000
6.
 - a. 10
 - b. \$18,000

Homework Samples

1. Round the factors to estimate the products.

a. $697 \times 82 \approx \underline{700} \times \underline{80} = \underline{56,000}$

A reasonable estimate for 697×82 is 56,000.

b. $5,897 \times 67 \approx \underline{6,000} \times \underline{70} = \underline{420,000}$

A reasonable estimate for $5,897 \times 67$ is 420,000.

c. $8,840 \times 45 \approx \underline{9,000} \times \underline{50} = \underline{450,000}$

A reasonable estimate for $8,840 \times 45$ is 450,000.

2. Complete the table using your understanding of place value and knowledge of rounding to estimate the product.

Expressions	Rounded Factors	Estimate
a. $3,409 \times 73$	$3,000 \times 70$	210,000
b. $82,290 \times 240$		
c. $9,832 \times 39$		
d. 98 tens \times 36 tens		
e. 893 hundreds \times 85 tens		

3. The estimated answer to a multiplication problem is 800,000. Which of the following expressions could result in this answer? Explain how you know.

$8,146 \times 12$

$81,467 \times 121$

$8,146 \times 121$

$81,477 \times 1,217$

$= 8,000 \times 100$
 $= 800,000$

Grade 5 Module 2 Topic B

The Standard Algorithm for Multi-Digit Whole Number Multiplication

Focus Standards:

- 5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
- 5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.*
- 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm.

Instructional Days Recommended: 7

In Topic B, place value understanding moves toward understanding the distributive property by using area models to generate and record partial products (**5.OA.1**, **5.OA.2**) which are combined within the standard algorithm (**5.NBT.5**). Writing and interpreting numerical expressions in Lessons 1 and 2, and comparing those expressions using visual models, lay the necessary foundation for students to make connections between the distributive property, as depicted in area models, and the partial products within the standard multiplication algorithm. The algorithm is built over a period of days, increasing in complexity as the number of digits in both factors increases. Reasoning about zeros in the multiplier, along with considerations about the reasonableness of products, also provides opportunities to deepen understanding of the standard algorithm. Although word problems provide context throughout Topic B, the final lesson offers a concentration of multi-step problems that allows students to apply this new knowledge.

**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 3

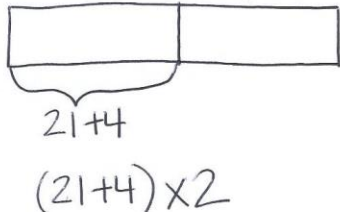
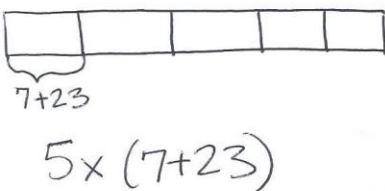
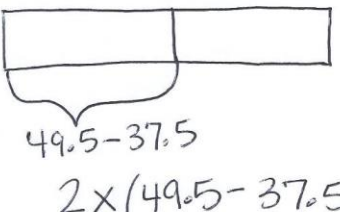
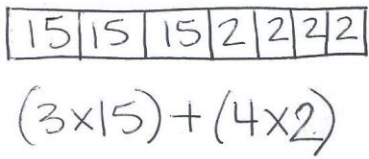
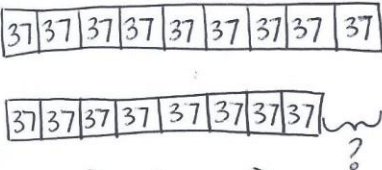
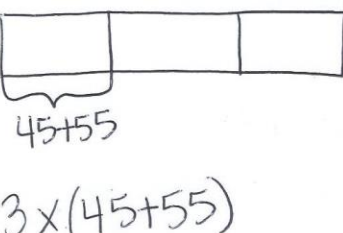
Objective: Write and interpret numerical expressions and compare expressions using a visual model.

Homework Key

1.
 - a. Accurate model drawn; $(21 + 4) \times 2$
 - b. Accurate model drawn; $5 \times (7 + 23)$
 - c. Accurate model drawn; $2 \times (49.5 - 37.5)$
 - d. Accurate model drawn; $3 \times 15 + 4 \times 2$
 - e. Accurate model drawn; $9 \times 37 - 8 \times 37$
 - f. Accurate model drawn; $3 \times (45 + 55)$
2.
 - a. Answers will vary; 160
 - b. Answers will vary; 220
 - c. Answers will vary; 2,600
 - d. Answers will vary; 130
3.
 - a. $>$; answers will vary.
 - b. $>$; answers will vary.
4.
 - a. No; answers will vary.
 - b. $(14 + 12) \times (8 + 12)$; 256

Homework Samples

1. Draw a model. Then, write the numerical expressions.

<p>a. The sum of 21 and 4, doubled</p>  <p>$21 + 4$ $(21 + 4) \times 2$</p>	<p>b. 5 times the sum of 7 and 23</p>  <p>$7 + 23$ $5 \times (7 + 23)$</p>
<p>c. 2 times the difference between 49.5 and 37.5</p>  <p>$49.5 - 37.5$ $2 \times (49.5 - 37.5)$</p>	<p>d. The sum of 3 fifteens and 4 twos</p>  <p>$(3 \times 15) + (4 \times 2)$</p>
<p>e. The difference between 9 thirty-sevens and 8 thirty-sevens</p>  <p>$(9 \times 37) - (8 \times 37)$</p>	<p>f. Triple the sum of 45 and 55</p>  <p>$45 + 55$ $3 \times (45 + 55)$</p>

Lesson 4

Objective: Convert numerical expressions into unit form as a mental strategy for multi-digit multiplication.

Homework Key

1. a. $(30 \times 19) - (7 \times 29)$ and $(40 - 2) \times 19$
 b. $(26 + 30) \times (26 + 5)$ and $35 \times (20 + 60)$
 c. $(34 \times 8) + (34 \times 9)$
2. a. 19; 20, 1; 1,000, 50; 950
 b. 11; 10, 1; 10, 1; 260, 26; 286
 c. 49; 50; 50, 1; 600, 12; 588
 d. 12; 10, 2; 10, 2; 250, 50; 300
3. a. Twelves; twelves, twelve; 12, 12; 360, 12; 348
 b. Elevens; elevens, eleven; 11, 11; 330, 11; 341
 c. Elevens; elevens, eleven; 11, 11; 220, 11; 209
 d. Fifties; fifties, fifties; 500, 150; 650
4. Answers will vary.
5. a. 1,584
 b. 2,020
6. 266 ft^2 ; answer will vary.
7. 2,323; answers will vary.

Homework Samples

1. Circle each expression that is not equivalent to the expression in **bold**.

a. 37×19

37 nineteens

$(30 \times 19) - (7 \times 29)$

$37 \times (20 - 1)$

$(40 - 2) \times 19$

b. 26×35

35 twenty-sixes

$(26 + 30) \times (26 + 5)$

$(26 \times 30) + (26 \times 5)$

$35 \times (20 + 60)$

c. 34×89

$34 \times (80 + 9)$

$(34 \times 8) + (34 \times 9)$

$34 \times (90 - 1)$

89 thirty-fours

2. Solve using mental math. Draw a tape diagram and fill in the blanks to show your thinking. The first one is partially done for you.

<p>a. $19 \times 50 = \underline{19}$ fifties</p> <div style="text-align: center; margin: 10px 0;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 5px 10px;">50</td> <td style="padding: 5px 10px;">50</td> <td style="padding: 5px 10px;">50</td> <td style="padding: 5px 10px;">...</td> <td style="padding: 5px 10px;">50</td> <td style="padding: 5px 10px; border: 2px solid black;">50</td> </tr> <tr> <td style="text-align: center; padding: 5px 10px;">1</td> <td style="text-align: center; padding: 5px 10px;">2</td> <td style="text-align: center; padding: 5px 10px;">3</td> <td style="text-align: center; padding: 5px 10px;">...</td> <td style="text-align: center; padding: 5px 10px;">19</td> <td style="text-align: center; padding: 5px 10px;">20</td> </tr> </table> </div> <p>Think: 20 fifties – 1 fifty</p> $= (\underline{20} \times 50) - (\underline{1} \times 50)$ $= \underline{1,000} - \underline{50}$ $= \underline{950}$	50	50	50	...	50	50	1	2	3	...	19	20	<p>b. $11 \times 26 = \underline{11}$ twenty-sixes</p> <div style="text-align: center; margin: 10px 0;"> <p><u>11 twenty-sixes</u></p> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 5px 10px;">26</td> <td style="padding: 5px 10px;">26</td> <td style="padding: 5px 10px;">26</td> <td style="padding: 5px 10px;">...</td> <td style="padding: 5px 10px;">26</td> </tr> </table> <p><u>10 twenty-sixes</u></p> <p style="margin-left: 150px;">1 twenty-six</p> </div> <p>Think: <u>10</u> twenty-sixes + <u>1</u> twenty-sixes</p> $= (\underline{10} \times 26) + (\underline{1} \times 26)$ $= \underline{260} + \underline{26}$ $= \underline{286}$	26	26	26	...	26
50	50	50	...	50	50													
1	2	3	...	19	20													
26	26	26	...	26														

Lesson 5

Objective: Connect visual models and the distributive property to partial products of the standard algorithm without renaming.

Homework Key

- 504
 - 5,082
- 6,908
 - 9,086
 - 6,816
- 2.99 m
- \$1,704

Homework Samples

1 a. $24 \times 21 = 504$

$$\begin{array}{r} 24 \\ \times 21 \\ \hline 24 \\ + 480 \\ \hline 504 \end{array}$$

b. $242 \times 21 = 5,082$

$$\begin{array}{r} 242 \\ \times 21 \\ \hline 242 \\ + 4840 \\ \hline 5082 \end{array}$$

4. Zenin earns \$142 per shift at his new job. During a pay period, he works 12 shifts. What would his pay be for that period?

$$\begin{array}{r} 142 \\ \times 12 \\ \hline 284 \\ + 1420 \\ \hline 1704 \end{array}$$

Zenin's pay would be \$1,704.

Lesson 6 - 7

Objective: Connect area models and the distributive property to partial products of the standard algorithm with renaming.

Homework Key (Lesson 6)

- 972
 - 18,972
- 34,397
 - 26,288
 - 34,868
 - 25,392
- \$6,000
- \$28,466

Homework Samples (Lesson 6)

- Draw an area model. Then, solve using the standard algorithm. Use arrows to match the partial products from your area model to the partial products in the algorithm.

a. 27×36

		20 + 7		
6	120	42	162	→
+				
30	600	210	810	→

27
<u>x 36</u>
<u>162</u>
+810
972

b. 527×36

		500 + 20 + 7			
6	3000	120	42	3162	→
+					
30	15000	600	210	15,810	→

527
<u>x 36</u>
<u>3162</u>
+15,810
18,972

Lesson 7

Homework Key

- | | |
|-----------------------|---------------|
| 1. a. 94,458 | 3. a. 152,082 |
| b. 83,538 | b. 509,082 |
| c. Answers will vary. | c. 130,782 |
| 2. a. 2,169,490 | d. 437,782 |
| b. 1,466,762 | 4. 986,595 |
| | 5. \$47,188 |

Homework Samples

1. Draw an area model. Then, solve using the standard algorithm. Use arrows to match the partial products from your area model to the partial products in your algorithm.

a. 273×346

$200 + 70 + 3$			
6	1,200	420	18
40	8,000	2,800	1,200
300	60,000	21,000	900

$1,638$ →
 $10,920$ →
 $81,900$ →

$$\begin{array}{r}
 273 \\
 \times 346 \\
 \hline
 1,638 \\
 10,920 \\
 + 81,900 \\
 \hline
 94,458
 \end{array}$$

b. 273×306

$200 + 70 + 3$			
6	1,200	420	18
40	8,000	2,800	1,200
300	60,000	21,000	900

$1,638$
 $81,900$

$$\begin{array}{r}
 273 \\
 \times 306 \\
 \hline
 1,638 \\
 + 81,900 \\
 \hline
 83,538
 \end{array}$$

- c. Both Parts (a) and (b) have three-digit multipliers. Why are there three partial products in Part (a) and only two partial products in Part (b)?

Since there is a zero in the tens place for part b, you do not need to have a section in the area model for it because it would be zero.

Lesson 8

Objective: Fluently multiply multi-digit whole numbers using the standard algorithm and using estimation to check for reasonableness of the product.

Homework Key

- 46,488
 - 210,000; 219,185
 - 240,000; 272,636
 - 210,000; 210,755
 - 2,520,000; 2,550,048
 - 1,500,000; 1,604,564
 - 1,200,000; 1,317,520
 - 1,500,000; 1,509,514
 - 1,800,000; 1,550,416
- No; answers will vary.
- 600,000; answers will vary.

Homework Samples

- Estimate the product first. Solve by using the standard algorithm. Use your estimate to check the reasonableness of the product.

<p>a. 312×149</p> <p>$\approx 300 \times 100$ $= 30,000$</p> $\begin{array}{r} 312 \\ \times 149 \\ \hline 2808 \\ 12480 \\ +31200 \\ \hline 46488 \end{array}$	<p>b. 743×295</p> <p>$\approx 700 \times 300$ $= 210,000$</p> $\begin{array}{r} 743 \\ \times 295 \\ \hline 3715 \\ 66870 \\ 148600 \\ \hline 219185 \end{array}$	<p>c. 428×637</p> <p>$\approx 400 \times 600$ $= 240,000$</p> $\begin{array}{r} 428 \\ \times 637 \\ \hline 2996 \\ 12840 \\ 256800 \\ \hline 272636 \end{array}$
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Lesson 9

Objective: Fluently multiply multi-digit whole numbers using the standard algorithm to solve multi-step word problems.

Homework Key

- 1,529
- a. 4,832 yd
b. 67,648 yd
- \$13,608
- 40,500 cm²
- a. $(120 \text{ yd} \times 80 \text{ yd}) - (100 \text{ yd} \times 55 \text{ yd}) = 4,100 \text{ yd}^2$
b. No; length is too short; answers will vary.
c. \$249,600

Homework Sample

Solve.

- Jeffery bought 203 sheets of stickers. Each sheet has a dozen stickers. He gave away 907 stickers to his family and friends on Valentine's Day. How many stickers does Jeffery have remaining?

$$\begin{array}{r} 203 \\ \times 12 \\ \hline 406 \\ + 2030 \\ \hline 2436 \end{array}$$

$$\begin{array}{r} 12,436 \\ - 907 \\ \hline 1,529 \end{array}$$

Jeffery has 1,529 stickers remaining.

Grade 5 Module 2 Topic C

Decimal Multi-Digit Multiplication

Focus Standard:

- 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: 3

Throughout Topic C, students make connections between what they know of whole number multiplication to its parallel role in multiplication with decimals by using place value to reason and make estimations about products (**5.NBT.7**). Knowledge of multiplicative patterns from Grade 4 experiences, as well as those provided in G5–Module 1, provide support for converting decimal multiplication to whole number multiplication. Students reason about how products of such converted cases must be adjusted through division, giving rise to explanations about how the decimal must be placed.

**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 10

Objective: Multiply decimal fractions with tenths by multi-digit whole numbers using place value understanding to record partial products.

Homework Key

1. a. 50, 1, 50; 63.6
- b. 2, 80, 160; 172.2
2. a. 4, 30, 120; 142.8
- b. 70, 6, 420; 377
- c. $3 \times 20 = 60$; 52.8
- d. $15 \times 20 = 300$; 265.2
- e. 75, 2, 150; 175.2
- f. 200, 60, 12,000; 11,029.5
3. 184.8 m²
4. 114 mi

Homework Samples

1. Estimate the product. Solve using an area model and the standard algorithm. Remember to express your products in standard form.

a. $53 \times 1.2 \approx \frac{50}{10} \times \frac{1}{2} = \frac{50}{20}$ 12 (tenths)

3	30	6	36 tenths
50	500	100	600 tenths

$$\begin{array}{r} \times 53 \\ 36 \\ \hline 600 \\ \hline 636 \text{ tenths} = 63.6 \end{array}$$

b. $2.1 \times 82 \approx \frac{2}{20} \times \frac{80}{1} = \frac{160}{20}$ 21 (tenths)

2	40	2	42 tenths
80	1600	80	1,680 tenths

$$\begin{array}{r} \times 82 \\ 42 \\ \hline + 1,680 \\ \hline 1,722 \text{ tenths} = 172.2 \end{array}$$

Lesson 11

Objective: Multiply decimal fractions by multi-digit whole numbers through conversion to a whole number problem and reasoning about the placement of the decimal

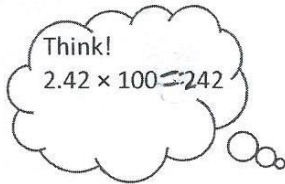
Homework Key

- 2, 12, 24; 29.04
 - 4, 40, 160; answers will vary; 152.81
- 26.39
 - 1,807.44
 - 19,675.19
 - 678.24
- 48.24
 - 2,246.16
 - 6,100.9
- \$42.39
- \$283.50
 - 65.21 m

Homework Samples

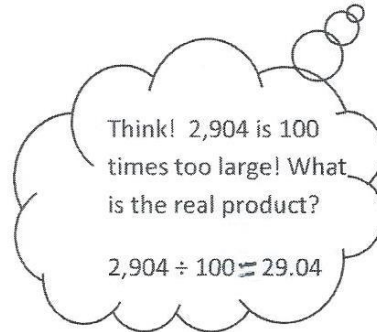
1. Estimate the product. Solve using the standard algorithm. Use the thought bubbles to show your thinking. (Draw an area model on a separate sheet if it helps you.)

a. $2.42 \times 12 \approx \underline{2} \times \underline{12} = \underline{24}$

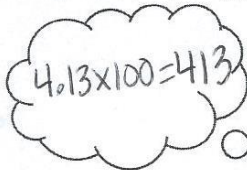


$$\begin{array}{r} 2.42 \\ \times 12 \\ \hline 484 \\ +2420 \\ \hline 2904 \end{array}$$

$2.42 \times 12 = \underline{29.04}$

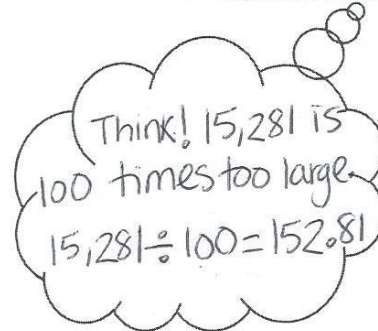


b. $4.13 \times 37 \approx \underline{4} \times \underline{40} = \underline{160}$



$$\begin{array}{r} 4.13 \\ \times 37 \\ \hline 2891 \\ +12390 \\ \hline 15281 \end{array}$$

$4.13 \times 37 = \underline{152.81}$



Lesson 12

Objective: Reason about the product of a whole number and a decimal with hundredths using place value understanding and estimation.

Homework Key

- | | | | | |
|----|----|-----------------------------|----|------------|
| 1. | a. | 25, 2, 50; 55.44 | 3. | 2,007.5 mi |
| | b. | 5, 300, 1,500; 1,653.1 | 4. | \$3,174.75 |
| 2. | a. | 1, 21, 21; 25.83 | 5. | \$13.60 |
| | b. | 3, 40, 120; 131.2 | | |
| | c. | 0.3, 40, 12; 13.12 | | |
| | d. | 0.5, 60, 30; 33.48 | | |
| | e. | 6, 30, 180; 170.52 | | |
| | f. | 7, 700, 4,900; 4,664.89 | | |
| | g. | 6, 200, 1,200; 1,266.72 | | |
| | h. | 200, 600, 120,000; 95,326.8 | | |

Homework Samples

1. Estimate. Then, solve using the standard algorithm. You may draw an area model if it helps you.

a. $24 \times 2.31 \approx \underline{25} \times \underline{2} = \underline{50}$

200 + 30 + 1 hundredths

4	800	120	4	924 hundredths
+				→
20	4,000	600	20	4,620 hundredths

Standard Algorithm:

$$\begin{array}{r} 2.31 \\ \times 24 \\ \hline 924 \\ +4620 \\ \hline 5,544 \end{array}$$

5,544 hundredths = 55.44

You can use both to double check your work.

b. $5.42 \times 305 \approx \underline{5} \times \underline{300} = \underline{1,500}$

500 + 40 + 2 hundredths

35	2500	200	10	2,710 hundredths
+				→
300	15,000	12,000	600	162,600 hundredths

Standard Algorithm:

$$\begin{array}{r} 5.42 \\ \times 305 \\ \hline 2710 \\ +162600 \\ \hline 165,310 \end{array}$$

165,310 hundredths = 1,653.10

You don't need a section for the tens place for the number 305.

Grade 5 Module 2 Topic D

Measurement Word Problems with Whole Number and Decimal Multiplication

Focus Standards:

- 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm.
- 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.
- 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: 3

In Topic D, students explore multiplication as a method for expressing equivalent measures. For example, they multiply to convert between meters and centimeters or ounces and cups with measurements in whole number, fraction, and decimal form (**5.MD.1**). These conversions offer opportunities for students to not only apply their newfound knowledge of multi-digit multiplication of both whole and decimal numbers but to also reason deeply about the relationships between unit size and quantity, i.e., how the choice of one affects the other. Students are given the opportunity to review multiplication of a whole number by a fraction, a skill taught in Grade 4.

**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: Use whole number multiplication to express equivalent measurements.

Homework Key

- | | |
|--------------------------|-----------------------|
| 1. a. Answer provided | 2. a. Answer provided |
| b. 7, 1; 7, 365; 2,555 | b. 65,000 g |
| c. 4.5, 1; 4.5, 100; 450 | c. 460 cm |
| d. 201.6 oz | d. 100 mL |
| e. 3,090 g | e. 156.8 oz |
| f. 8,820 in | f. 130 mm |

Homework Samples

1. Solve. The first one is done for you.

<p>a. Convert weeks to days.</p> $6 \text{ weeks} = 6 \times (1 \text{ week})$ $= 6 \times (7 \text{ days})$ $= 42 \text{ days}$	<p>b. Convert years to days.</p> $7 \text{ years} = \underline{7} \times (\underline{1} \text{ year})$ $= \underline{7} \times (\underline{365} \text{ days})$ $= \underline{2,555} \text{ days}$
<p>c. Convert meters to centimeters.</p> $4.5 \text{ m} = \underline{4.5} \times (\underline{1} \text{ m})$ $= \underline{4.5} \times (\underline{100} \text{ cm})$ $= \underline{450} \text{ cm}$	<p>d. Convert pounds to ounces.</p> $12.6 \text{ pounds} = 12.6 \times (1 \text{ pound})$ $= 12.6 \times (16 \text{ ounces})$ $= 201.6 \text{ ounces}$
<p>e. Convert kilograms to grams.</p> $3.09 \text{ kg} = 3.09 \times (1 \text{ kg})$ $= 3.09 \times (1,000 \text{ g})$ $= 3,090 \text{ g}$	<p>f. Convert yards to inches.</p> $245 \text{ yd} = 245 \times (1 \text{ yard})$ $= 245 \times (36 \text{ inches})$ $= 8,820 \text{ inches}$

1 yard = 3 feet = 36 inches

Lesson 14

Objective: Use fraction and decimal multiplication to express equivalent measurements.

Homework Key

- | | |
|---|---|
| <p>1. a. Answer provided</p> <p>b. 36; $36; \frac{36}{4}; 9$</p> <p>c. 760, 1; 760, 0.01; 7.6</p> <p>d. 2,485, 1; 2,485; 2.485</p> <p>e. 3.09 kg</p> <p>f. 0.205 L</p> | <p>2. a. Answer provided</p> <p>b. 4 pints</p> <p>c. 5.29 m</p> <p>d. 2.06 L</p> <p>e. 1,560 kg</p> <p>f. 372.06 km</p> |
|---|---|

Homework Samples

1. Solve. The first one is done for you.

<p>a. Convert days to weeks.</p> <p>42 days = $42 \times (1 \text{ day})$</p> <p>= $42 \times (\frac{1}{7} \text{ week})$</p> <p>= $\frac{42}{7} \text{ week}$</p> <p>= 6 weeks</p>	<p>b. Convert quarts to gallons.</p> <p>36 quarts = $\underline{36} \times (1 \text{ quart})$</p> <p>= $\frac{36}{4} \times (\frac{1}{4} \text{ gallon})$</p> <p>= $\frac{36}{4}$ gallons</p> <p>= $\underline{9}$ gallons</p>
<p>c. Convert centimeters to meters.</p> <p>760 cm = $\underline{760} \times (\underline{1} \text{ cm})$</p> <p>= $\underline{760} \times (\underline{0.01} \text{ m})$</p> <p>= $\underline{7.6} \text{ m}$</p>	<p>d. Convert meters to kilometers.</p> <p>2,485 m = $\underline{2,485} \times (\underline{1} \text{ m})$</p> <p>= $\underline{2,485} \times (0.001 \text{ km})$</p> <p>= $\underline{2.485} \text{ km}$</p>
<p>e. Convert grams to kilograms.</p> <p>3,090 g = $3,090 \times (1 \text{ gram})$</p> <p>= $3,090 \times (0.001 \text{ kg})$</p> <p>= 3.09 kg</p>	<p>f. Convert milliliters to liters.</p> <p>205 mL = $205 \times (1 \text{ mL})$</p> <p>= $205 \times (0.001 \text{ L})$</p> <p>= 0.205 L</p>

Lesson 15

Objective: Solve two-step word problems involving measurement conversions.

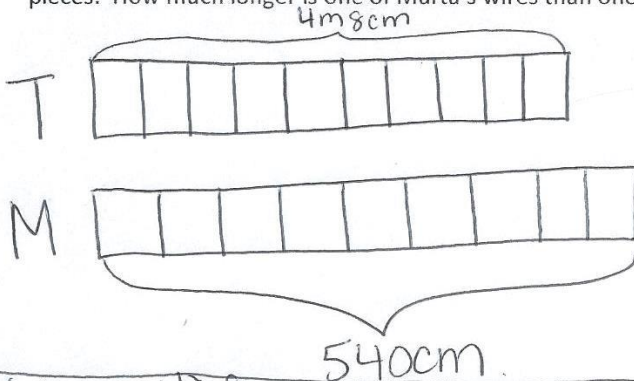
Homework Key

- 19.2 cm
- 11 gal
- 35.7 m
- a. 1160 g
b. 1.16kg

Homework Sample

Solve.

- Tia cut a 4 meters 8 centimeters wire into 10 equal pieces. Marta cut a 540 centimeters wire into 9 equal pieces. How much longer is one of Marta's wires than one of Tia's?



$$\begin{aligned} \text{Tia: } 4\text{m} &= 4 \times (1\text{m}) \\ &= 4 \times (100\text{cm}) \\ &= 400\text{cm} \end{aligned}$$

$$400\text{cm} + 8\text{cm} = 408\text{cm}$$

$$\begin{aligned} 10 \text{ units} &= 408\text{cm} \\ 1 \text{ unit} &= 40.8\text{cm} \end{aligned}$$

$$\begin{aligned} \text{Marta: } 9 \text{ units} &= 540\text{cm} \\ 1 \text{ unit} &= 60\text{cm} \end{aligned}$$

Answer: $60\text{cm} - 40.8\text{cm} = 19.2\text{cm}$
One of Marta's wires is 19.2cm longer than Tia's.

Grade 5 Module 2 Topic E

Mental Strategies for Multi-Digit Whole Number Division

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 power of 10.
- 5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Instructional Days Recommended: 3

Topics E through H provide a parallel sequence for division to that offered in Topics A to D for multiplication. Topic E begins concretely with place value disks as an introduction to division with multi-digit whole numbers (**5.NBT.6**). In the same lesson, $420 \div 60$ is interpreted as $420 \div 10 \div 6$. Next, students round dividends and 2-digit divisors to nearby multiples of ten in order to estimate single digit quotients (e.g., $431 \div 58 \approx 420 \div 60 = 7$) and then multi-digit quotients. This work is done horizontally, outside the context of the written vertical method.

**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 16

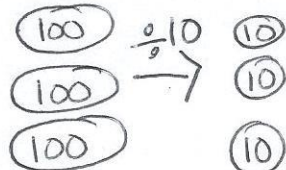
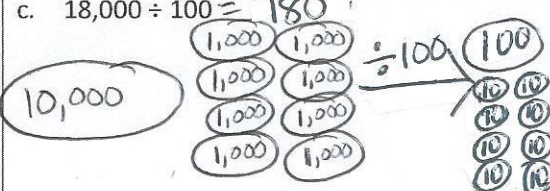
Objective: Use *divide by 10* patterns for multi-digit whole number division.

Homework Key

- 30
 - 45
 - 180
 - 7,300
 - 900
 - 680
- Answer provided
 - 90
 - 9
 - 7,000
 - 700
 - 70
 - 800
 - 800
 - 50
- 200
- 4
 - 16

Homework Samples

- Divide. Draw place value disks to show your thinking for (a) and (c). You may draw disks on your personal white board to solve the others if necessary.

a. $300 \div 10 = 30$ 	b. $450 \div 10 = 45$ $= 45 \div 1$ $= 45$
c. $18,000 \div 100 = 180$ 	d. $730,000 \div 100 = 7,300$ $= 7,300 \div 1$ $= 7,300$
e. $900,000 \div 1,000 = 900$ $= 900 \div 1$ $= 900$	f. $680,000 \div 1,000 = 680$ $= 680 \div 1$ $= 680$

Lesson 17 - 18

Objective: Use basic facts to approximate quotients with two-digit divisors.

Homework Key (Lesson 17)

Estimates may vary.

1.
 - a. Answers provided
 - b. 600; 20; 30
 - c. 800; 40; 20
 - d. 500; 50; 10
 - e. 500; 50; 10
 - f. 140; 70; 2
 - g. 480; 80; 6
 - h. 630; 70; 9
 - i. 600; 100; 6
 - j. 300; 30; 10
 - k. 720; 80; 9
 - l. 630; 30; 21
 - m. 810; 90; 9
 - n. 350; 70; 5
 - o. 550; 11; 50
2. \$8
3. $160 \div 40 = 4$ barrels; answers will vary.

Homework Samples (Lesson 17)

1. Estimate the quotient for the following problems. The first one is done for you.

a. $821 \div 41$ $\approx 800 \div 40$ $= 20$	b. $617 \div 23$ $\approx 600 \div 20$ $= 30$	c. $821 \div 39$ $\approx 800 \div 40$ $= 20$
d. $482 \div 52$ $\approx 500 \div 50$ $= 10$	e. $531 \div 48$ $\approx 500 \div 50$ $= 10$	f. $141 \div 73$ $\approx 140 \div 70$ $= 2$
g. $476 \div 81$ $\approx 480 \div 80$ $= 6$	h. $645 \div 69$ $\approx 630 \div 70$ $= 9$	i. $599 \div 99$ $\approx 600 \div 100$ $= 6$
j. $301 \div 26$ $\approx 300 \div 30$ $= 10$	k. $729 \div 81$ $\approx 720 \div 80$ $= 9$	l. $636 \div 25$ $\approx 630 \div 30$ $= 21$
m. $835 \div 89$ $\approx 810 \div 90$ $= 9$	n. $345 \div 72$ $\approx 350 \div 70$ $= 5$	o. $559 \div 11$ $\approx 550 \div 11$ $= 50$

Lesson 18

Homework Key

Estimates may vary.

1. a. Answers provided
b. 2,000; 20; 100
c. 8,000; 40; 200
d. 3,600; 60; 60
e. 2,800; 70; 40
f. 5,400; 90; 60
g. 4,900; 70; 70
h. 8,100; 81; 100
i. 9,000; 90; 100
j. 3,000; 50; 60
k. 8,100; 90; 90
l. 4,200; 60; 70
m. 6,300; 70; 90
n. 5,000; 50; 100
o. 6,000; 30; 200
2. 26
3. 30; 11; 3; 40; answers will vary.

Homework Samples

1. Estimate the quotients for the following problems. The first one is done for you.

a. $8,328 \div 41$ $\approx 8,000 \div 40$ $= 200$	b. $2,109 \div 23$ $\approx \frac{2,000}{20}$ $= 100$	c. $8,215 \div 38$ $\approx \frac{8,000}{40}$ $= 200$
d. $3,861 \div 59$ $\approx \frac{4,000}{60}$ $= 80$	e. $2,899 \div 66$ $\approx \frac{2,800}{70}$ $= 40$	f. $5,576 \div 92$ $\approx \frac{5,400}{90}$ $= 60$
g. $5,086 \div 73$ $\approx \frac{4,900}{70}$ $= 70$	h. $8,432 \div 81$ $\approx \frac{8,100}{81}$ $= 100$	i. $9,032 \div 89$ $\approx \frac{9,000}{90}$ $= 100$
j. $2,759 \div 48$ $\approx \frac{3,000}{50}$ $= 60$	k. $8,194 \div 91$ $\approx \frac{8,100}{90}$ $= 90$	l. $4,368 \div 63$ $\approx \frac{4,200}{60}$ $= 70$
m. $6,537 \div 74$ $\approx \frac{6,300}{70}$ $= 90$	n. $4,998 \div 48$ $\approx \frac{5,000}{50}$ $= 100$	o. $6,106 \div 25$ $\approx \frac{6,000}{30}$ $= 200$

Grade 5 Module 2 Topic F

Partial Quotients and Multi-Digit Whole Number Division

Focus Standard:

5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Instructional Days Recommended: 5

The series of lessons in Topic F leads students to divide multi-digit dividends by two-digit divisors using the written vertical method. Each lesson moves to a new level of difficulty with a sequence beginning with divisors that are multiples of 10 to non-multiples of 10. Two instructional days are devoted to single-digit quotients with and without remainders before progressing to two- and three-digit quotients (**5.NBT.6**).

**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 19

Objective: Divide two- and three-digit dividends by multiples of 10 with single-digit quotients and make connections to a written method.

Homework Key

- Answer provided
 - 2 R10; accurate check shown
 - 1 R35; accurate check shown
 - 9 R10; accurate check shown
 - 7 R17; accurate check shown
 - 4 R26; accurate check shown
- 256
- 18
- 4

Homework Samples

1. Divide, and then check using multiplication. The first one is done for you.

a. $71 \div 20$

$$\begin{array}{r} 3 \text{ R } 11 \\ 20 \overline{) 71} \\ \underline{- 60} \\ 11 \end{array}$$

Check:

$$20 \times 3 = 60$$

$$60 + 11 = 71$$

b. $90 \div 40$

$$\begin{array}{r} 2 \text{ R } 10 \\ 40 \overline{) 90} \\ \underline{- 80} \\ 10 \end{array}$$

$$40 \times 2 = 80$$

$$80 + 10 = 90$$

Multiply the divisor by the quotient then add the remainder. This should equal the dividend.

c. $95 \div 60$

$$\begin{array}{r} 1 \text{ R } 35 \\ 60 \overline{) 95} \\ \underline{- 60} \\ 35 \end{array}$$

$$60 \times 1 = 60$$

$$60 + 35 = 95$$

d. $280 \div 30$

$$\begin{array}{r} 9 \text{ R } 10 \\ 30 \overline{) 280} \\ \underline{- 270} \\ 10 \end{array}$$

$$30 \times 9 = 270$$

$$270 + 10 = 280$$

e. $437 \div 60$

$$\begin{array}{r} 7 \text{ R } 17 \\ 60 \overline{) 437} \\ \underline{- 420} \\ 17 \end{array}$$

$$60 \times 7 = 420$$

$$420 + 17 = 437$$

f. $346 \div 80$

$$\begin{array}{r} 4 \text{ R } 26 \\ 80 \overline{) 346} \\ \underline{- 320} \\ 26 \end{array}$$

$$80 \times 4 = 320$$

$$320 + 26 = 346$$

Lesson 20 - 21

Objective: Divide two-and three-digit dividends by two-digit divisors with single-digit quotients and make connections to a written method.

Homework Key (Lesson 20)

- Answer provided
 - 4 R5
 - 2 R28
 - 3 R10
 - 3 R4
 - 3 R20
- 7 ft
- 6 full plates with 12 remaining
 - 2 bagels

Homework Samples (Lesson 20)

1. Divide. Then, check with multiplication. The first one is done for you.

a. $72 \div 31$

$$\begin{array}{r} 2 \text{ R } 10 \\ 31 \overline{) 72} \\ \underline{- 62} \\ 10 \end{array}$$

Check:

$$31 \times 2 = 62$$

$$62 + 10 = 72$$

b. $89 \div 21$

$$\begin{array}{r} 4 \text{ R } 5 \\ 21 \overline{) 89} \\ \underline{- 84} \\ 5 \end{array}$$

check

$$\begin{array}{l} 21 \times 4 = 84 \\ 84 + 5 = 89 \end{array}$$

c. $94 \div 33$

$$\begin{array}{r} 2 \text{ R } 28 \\ 33 \overline{) 94} \\ \underline{- 66} \\ 28 \end{array}$$

Check

$$33 \times 2 = 66$$

$$66 + 28 = 94$$

d. $67 \div 19$

$$\begin{array}{r} 3 \text{ R } 10 \\ 19 \overline{) 67} \\ \underline{- 57} \\ 10 \end{array}$$

check

$$19 \times 3 = 57$$

$$57 + 10 = 67$$

Lesson 21

Homework Key

- Answer provided
 - 4 R10
 - 5 R16
 - 7
 - 8
 - 8 R8
- 4
- 8

Homework Samples

1. Divide. Then, check using multiplication. The first one is done for you.

a. $129 \div 21$

$$\begin{array}{r} 6 \text{ R} 3 \\ 21 \overline{) 129} \\ \underline{- 126} \\ 3 \end{array}$$

Check:

$$21 \times 6 = 126$$

$$126 + 3 = 129$$

b. $158 \div 37$

$$\begin{array}{r} 4 \text{ R} 10 \\ 37 \overline{) 158} \\ \underline{- 148} \\ 10 \end{array}$$

Check

$$37 \times 4 = 148$$

$$148 + 10 = 158$$

c. $261 \div 49$

$$\begin{array}{r} 5 \text{ R} 16 \\ 49 \overline{) 261} \\ \underline{- 245} \\ 16 \end{array}$$

Check

$$49 \times 5 = 245$$

$$245 + 16 = 261$$

d. $574 \div 82$

$$\begin{array}{r} 7 \\ 82 \overline{) 574} \\ \underline{- 574} \\ 0 \end{array}$$

Check

$$82 \times 7 = 574$$

e. $464 \div 58$

$$\begin{array}{r} 8 \\ 58 \overline{) 464} \\ \underline{- 464} \\ 0 \end{array}$$

Check

$$58 \times 8 = 464$$

Lesson 22 - 23

Objective: Divide three- and four-digit dividends by two-digit divisors resulting in two- and three-digit quotients, reasoning about the decomposition of successive remainders in each place value.

Homework Key (Lesson 22)

- Answer provided
 - 32 R5
 - 33 R7
 - 12 R27
 - 19 R22
 - 16 R12
- Explanations may vary.
- Explanations may vary.

Homework Samples (Lesson 22)

1. Divide. Then, check using multiplication. The first one is done for you.

a. $487 \div 21$

$$\begin{array}{r} 23 \text{ R}4 \\ 21 \overline{)487} \\ \underline{-42} \\ 67 \\ \underline{-63} \\ 4 \end{array}$$

Check:

$$21 \times 23 = 483$$

$$483 + 4 = 487$$

b. $485 \div 15$

$$\begin{array}{r} 32 \text{ R}5 \\ 15 \overline{)485} \\ \underline{-45} \\ 35 \\ \underline{-30} \\ 5 \end{array}$$

check
 $15 \times 32 = 480$
 $480 + 5 = 485$

c. $700 \div 21$

$$\begin{array}{r} 33 \text{ R}7 \\ 21 \overline{)700} \\ \underline{-63} \\ 70 \\ \underline{-63} \\ 7 \end{array}$$

check
 $21 \times 33 = 693$
 $693 + 7 = 700$

d. $399 \div 31$

$$\begin{array}{r} 12 \text{ R}27 \\ 31 \overline{)399} \\ \underline{-31} \\ 89 \\ \underline{-62} \\ 27 \end{array}$$

check
 $31 \times 12 = 372$
 $372 + 27 = 399$

e. $820 \div 42$

$$\begin{array}{r} 19 \text{ R}22 \\ 42 \overline{)820} \\ \underline{-42} \\ 400 \\ \underline{-378} \\ 22 \end{array}$$

check
 $42 \times 19 = 798$
 $798 + 22 = 820$

Lesson 23

Homework Key

1. a. 242 R40
- b. 33 R10
- c. 238 R27
- d. 82 R1
- e. 126 R15
- f. 93 R55
2. 565
3. 57

Homework Samples

1. Divide. Then, check using multiplication.

a. $9,962 \div 41$

$$\begin{array}{r} 242 \text{ R}40 \\ 41 \overline{) 9962} \\ \underline{-82} \\ 176 \\ \underline{-164} \\ 122 \\ \underline{-82} \\ 40 \end{array}$$

check

$$41 \times 242 = 9,922$$

$$9,922 + 40 = 9,962$$

b. $1,495 \div 45$

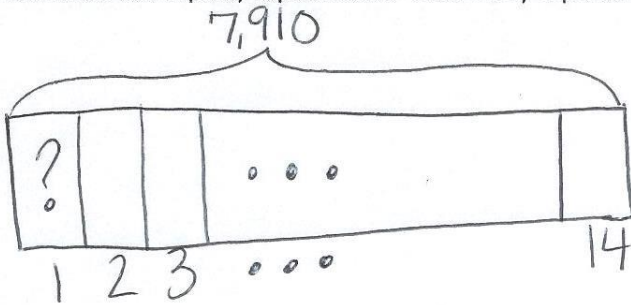
$$\begin{array}{r} 33 \text{ R}10 \\ 45 \overline{) 1495} \\ \underline{-135} \\ 145 \\ \underline{-135} \\ 10 \end{array}$$

check

$$45 \times 33 = 1,485$$

$$1,485 + 10 = 1,495$$

2. A political gathering in South America was attended by 7,910 people. Each of South America's 14 countries was equally represented. How many representatives attended from each country?



$$\begin{array}{r} 565 \\ 14 \overline{) 7910} \\ \underline{-70} \\ 91 \\ \underline{-84} \\ 70 \\ \underline{-70} \\ 0 \end{array}$$

Answer: 565 representatives attended from each country.

Grade 5 Module 2 Topic G

Partial Quotients and Multi-Digit Decimal Division

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 power of 10.
- 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 G uses the knowledge students have accumulated about whole number division with double-digit divisors, and extends it to division of decimals by double-digit divisors (**5.NBT.7**). Parallels between sharing or grouping whole number units, and sharing or grouping decimal units are the emphasis of Topic G. Students quickly surmise that the concepts of division remain the same regardless of the size of the units being shared or grouped. Placement of the decimal point in quotients is based on students' reasoning about when wholes are being shared or grouped, and when the part being shared or grouped transitions into fractional parts. Students reason about remainders in a deeper way than in previous grades. Students consider cases in which remainders expressed as whole numbers appear to be equivalent; however, equivalence is disproven when such remainders are decomposed as decimal units and shared or grouped.

**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 24

Objective: Divide decimal dividends by multiples of 10, reasoning about the placement of the decimal point and making connections to a written method.

Homework Key

- Answer provided
 - Answer provided
 - 0.3
 - $(2.4 \div 80) \div 10 = 0.3 \div 10 = 0.03$
 - 7.3
 - $(14.6 \div 20) \div 10 = 7.3 \div 10 = 0.73$
 - 0.2
 - $(80 \div 4) \div 100 = 20 \div 100 = 0.2$
 - 0.08
 - $(0.56 \div 7) \div 10 = 0.08 \div 10 = 0.008$
 - 1.05
 - $(9.45 \div 9) \div 100 = 1.05 \div 100 = 0.0105$
- 8.2; explanations may vary.
 - 0.5; explanations may vary.
 - 4.8; explanations may vary.
 - 0.66; explanations may vary.
- 2.13 mi; explanations may vary.
 - 29.82 mi
- 70 mL

Homework Samples

1. Divide. Show every other division sentence in two steps. The first two have been done for you.

a. $1.8 \div 6 = 0.3$

b. $1.8 \div 60 = (1.8 \div 6) \div 10 = 0.3 \div 10 = 0.03$

c. $2.4 \div 8 = \underline{0.3}$

d. $2.4 \div 80 = \underline{(2.4 \div 8) \div 10 = 0.3 \div 10 = 0.03}$

e. $14.6 \div 2 = \underline{7.3}$

f. $14.6 \div 20 = \underline{(14.6 \div 2) \div 10 = 7.3 \div 10 = 0.73}$

g. $0.8 \div 4 = \underline{0.2}$

h. $80 \div 400 = \underline{(80 \div 40) \div 10 = 2 \div 10 = 0.2}$

i. $0.56 \div 7 = \underline{0.08}$

j. $0.56 \div 70 = \underline{(0.56 \div 7) \div 10 = 0.08 \div 10 = 0.008}$

k. $9.45 \div 9 = \underline{1.05}$

l. $9.45 \div 900 = \underline{(9.45 \div 9) \div 100 = 1.05 \div 100 = 0.0105}$

Lesson 25

Objective: Use basic facts to approximate decimal quotients with two-digit divisors, reasoning about the placement of the decimal point.

Homework Key

- ≈ 0.07
 - ≈ 0.6
 - ≈ 0.40
 - ≈ 2
 - ≈ 0.12
- ≈ 0.2
 - ≈ 20
 - ≈ 2
- $\approx \$0.75$; answers may vary.
- ≈ 0.5 gal; answers may vary.
 - ≈ 3.5 gal
 - ≈ 40 days

Homework Samples

1. Estimate the quotients.

a. $3.53 \div 51 \approx 350 \text{ hundredths} \div 50 = 7 \text{ hundredths} = 0.07$

b. $24.2 \div 42 \approx 240 \text{ tenths} \div 40 = 6 \text{ tenths} = 0.6$

c. $9.13 \div 23 \approx 800 \text{ hundredths} \div 20 = 40 \text{ hundredths} = 0.40$

d. $79.2 \div 39 \approx 800 \text{ hundredths} \div 40 = 20 \text{ hundredths} = 0.20$

e. $7.19 \div 58 \approx 720 \text{ hundredths} \div 60 = 12 \text{ hundredths} = 0.12$

Lesson 26 - 27

Objective: Divide decimal dividends by two-digit divisors, estimating quotients, reasoning about the placement of the decimal point, and making connections to a written method.

Homework Key (Lesson 26)

- Answers will vary.
- All answers should include a multiplication sentence to check division.
 - 3.45
 - 5.12
 - 2.03
 - 0.42
- 2.87
 - 1.23
- 1.21; answers will vary
 - 5.3; answers will vary
- 14.2 ft
 - 3.35 ft taller

Homework Samples (Lesson 26)

- Create two whole number division problems that have a quotient of 9 and a remainder of 5. Justify which is greater using decimal division.

Handwritten work for problem 1:

$$\begin{array}{r} 9R5 \\ ? \overline{) ?} \end{array}$$

$$\begin{array}{r} 9R5 \\ 7 \overline{) 68} \\ \underline{-63} \\ 5 \end{array} \rightarrow \begin{array}{r} 9.714 \\ 7 \overline{) 68.000} \\ \underline{-63} \\ 50 \\ \underline{-49} \\ 10 \\ \underline{-7} \\ 30 \\ \underline{-28} \\ 2 \end{array}$$

$$\begin{array}{r} 9R5 \\ 8 \overline{) 77} \\ \underline{-72} \\ 5 \end{array}$$

$$\begin{array}{r} 9.625 \\ 8 \overline{) 77.000} \\ \underline{-72} \\ 50 \\ \underline{-48} \\ 20 \\ \underline{-16} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

$$68 \div 7 > 77 \div 8$$

- Divide. Then, check your work with multiplication.

a. $75.9 \div 22$

$$\begin{array}{r} 3.45 \\ 22 \overline{) 75.90} \\ \underline{-66} \\ 99 \\ \underline{-88} \\ 110 \\ \underline{-110} \\ 0 \end{array}$$

$$22 \times 3.45 = 75.90$$

Lesson 27

Homework Key

- All answers should include a multiplication sentence to check division.
 - 0.25
 - 2.04
 - 0.5
 - 8.26
 - 20.06
 - 16.8
- 0.85 L; 850 mL
- 6.75 kg
- 24.15 L

Homework Sample

- Divide. Check your work with multiplication.

a. $7 \div 28$

$$\begin{array}{r} 0.25 \\ 28 \overline{) 7.00} \\ \underline{-56} \\ 140 \\ \underline{-140} \\ 0 \end{array}$$

Check
 $28 \times 0.25 = 7.00$

b. $51 \div 25$

$$\begin{array}{r} 2.04 \\ 25 \overline{) 51.00} \\ \underline{-50} \\ 100 \\ \underline{-100} \\ 0 \end{array}$$

Check
 $25 \times 2.04 = 51$

c. $6.5 \div 13$

$$\begin{array}{r} 0.5 \\ 13 \overline{) 6.5} \\ \underline{-65} \\ 0 \end{array}$$

Check
 $13 \times 0.5 = 6.5$

Grade 5 Module 2 Topic H

Measurement Word Problems with Multi-Digit Decimal Division

Focus Standards:

- 5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
- 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

In Topic H, students apply the work of the module to solve multi-step word problems using multi-digit division (**5.NBT.6**). Cases include unknowns representing either the group size or number of groups. In this topic, an emphasis on checking the reasonableness of their solutions draws on skills learned throughout the module, which includes using knowledge of place value, rounding, and estimation. Students relate calculations to reasoning about division through a variety of strategies including place value, properties of operations, equations, and area models.

**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 28 - 29

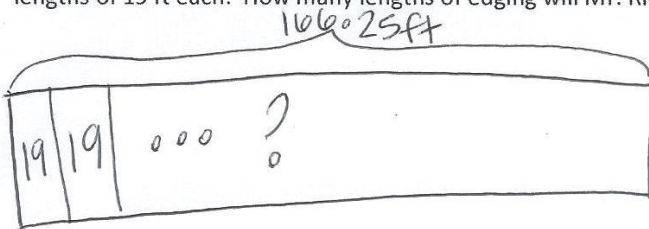
Objective: Solve division word problems involving multi-digit division with group size unknown and the number of groups unknown.

Homework Key (Lesson 28)

1. 9
2. 2.22 oz
3. 0.67 kg
4. \$5.75
5. 38

Homework Sample (Lesson 28)

1. Mr. Rice needs to replace the 166.25 ft of edging on the flower beds in his backyard. The edging is sold in lengths of 19 ft each. How many lengths of edging will Mr. Rice need to purchase?



Mr. Rice will need to purchase 9 lengths to have enough.

$$\begin{array}{r} 8.75 \\ 19 \overline{) 166.25} \\ \underline{-152} \\ 1342 \\ \underline{-133} \\ 95 \end{array}$$

You can't get 8.75 lengths, so you need 9.

Lesson 29

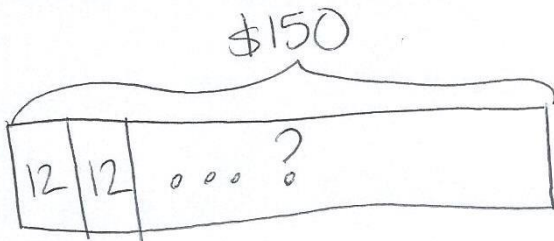
Homework Key

1. 13
2. \$178
3. 64.5 m
4. \$3.50
5. 6.25 km²

Homework Sample

Solve.

1. Michelle wants to save \$150 for a trip to the Six Flags amusement park. If she saves \$12 each week, how many weeks will it take her to save enough money for the trip?



It will take Michelle 13 weeks to save \$150.

$$\begin{array}{r} 12.5 \\ 12 \overline{) 150.0} \\ \underline{-12} \\ 30 \\ \underline{-24} \\ 60 \\ \underline{-60} \\ 0 \end{array}$$

Michelle will need to save for 13 weeks, 12.5 rounded to the next week, for her trip.