



MISSION OVERVIEW

Grade 5, Mission 2 Base Ten Operations

Mission 1 introduced students to decimal fractions, and Mission 2 will introduce them to similar conceptual work (mental math, reasoning, conceptual models, and algorithms), but with whole numbers. Students will multiply multi-digit whole numbers in the first part of the Mission and divide them in the end. Each operation concludes with application work and measurement word problems.

CURRICULUM MAP

WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K	M1 Numbers to 10 Lessons (37)					M2 2D & 3D Shapes Lessons (10)		M3 Comparison of Length, Weight, Capacity, & Numbers to 10 Lessons (32)					M4 Number Pairs, Addition, & Subtraction to 10 Lessons (41)					M5 Numbers 10-20; Count to 100 by Ones & Tens Lessons (24)				M6 Analyzing, Comparing, & Composing Shapes Lessons (8)														
	Numbers to 5 Digital Activities (35)					Numbers to 10 Digital Activities (41)					Numbers to 15 Digital Activities (25)					Numbers to 20 Digital Activities (25)																				
G1	M1 Add & Subtract Small Numbers IDL (32) SGL (32)					M2 Meet Place Value IDL (23) SGL (23)					M3 Measure Length IDL (10) SGL (10)		M4 Add & Subtract Bigger Numbers IDL (23) SGL (23)					M5 Work with Shapes IDL (13) SGL (13)		M6 Add & Subtract to 100 IDL (18) SGL (18)																
G2	M1 Add & Subtract Friendly Numbers IDL (8) SGL (8)		M2 Explore Length IDL (10) SGL (10)		M3 Counting & Place Value IDL (19) SGL (19)			M4 Add, Subtract, & Solve IDL (29) SGL (29)					M5 Add & Subtract Big Numbers IDL (20) SGL (20)		M6 Equal Groups IDL (16) SGL (16)		M7 Length, Money, & Data IDL (19) SGL (19)		M8 Shapes, Time, & Fractions IDL (12) SGL (12)																	
G3	M1 Multiply & Divide Friendly Numbers IDL (21) SGL (21)				M2 Measure It IDL (21) SGL (21)				M3 Multiply & Divide Tricky Numbers IDL (21) SGL (21)				M4 Find the Area IDL (16) SGL (16)		M5 Fractions as Numbers IDL (29) SGL (29)			M6 Display Data IDL (9) SGL (9)	M7 Shapes & Measurement IDL (19) SGL (19)																	
G4	M1 Add, Subtract & Round IDL (18) SGL (18)		M2 Measure & Solve IDL (5) SGL (5)	M3 Multiply & Divide Big Numbers IDL (34) SGL (34)					M4 Construct Lines, Angles, & Shapes IDL (14) SGL (14)		M5 Equivalent Fractions IDL (38) SGL (38)				M6 Decimal Fractions IDL (15) SGL (15)		M7 Multiply & Measure IDL (12) SGL (12)																			
G5	M1 Place Value with Decimal Fractions IDL (16) SGL (16)		M2 Base Ten Operations IDL (29) SGL (29)				M3 Add & Subtract Fractions IDL (16) SGL (16)		M4 Multiply and Divide Fractions & Decimals IDL (32) SGL (32)				M5 Volume, Area, & Shapes IDL (19) SGL (19)		M6 The Coordinate Plane IDL (24) SGL (24)																					

● Whole Numbers & Operations ● Measurement, Data, & Shapes ● Fractions & Decimals IDL = Independent Digital Lessons SGL = Small Group Lessons

Overview of Topics and Lesson Objectives

Each mission is broken down into topics. A topic is a group of lessons that teach the same concept. For each topic, Zearn offers Whole Group Fluencies, Whole Group Word Problems, Small Group Lessons, and Independent Digital Lessons. There is a balance of Independent Digital Lessons and Small Group Lessons in each topic of a mission to ensure every student learns with a mix of modalities, feedback, and support while engaging in grade-level content. Throughout each mission, students work on grade-level content with embedded remediation to fill gaps in prior knowledge.

Objective		INDEPENDENT DIGITAL LESSON	SMALL GROUP LESSON
Topic A	Mental Strategies for Multi-Digit Whole Number Multiplication 5.NBT.1, 5.NBT.2, 5.OA.1		
Lesson 1	Multiply multi-digit whole numbers and multiples of 10 using place value patterns and the distributive and associative properties.	✓	✓
Lesson 2	Estimate multi-digit products by rounding factors to a basic fact and using place value patterns.	✓	✓
Topic B	The Standard Algorithm for Multi-Digit Whole Number Multiplication 5.OA.1, 5.OA.2, 5.NBT.5		
Lesson 3	Write and interpret numerical expressions, and compare expressions using a visual model.	✓	✓
Lesson 4	Convert numerical expressions into unit form as a mental strategy for multi-digit multiplication.	✓	✓
Lesson 5	Connect visual models and the distributive property to partial products of the standard algorithm without renaming.	✓	✓
Lesson 6	Connect area models and the distributive property to partial products of the standard algorithm with renaming.	✓	✓
Lesson 7	Connect area models and the distributive property to partial products of the standard algorithm with renaming.	✓	✓
Lesson 8	Fluently multiply multi-digit whole numbers using the standard algorithm and using estimation to check for reasonableness of the product.	✓	✓
Lesson 9	Fluently multiply multi-digit whole numbers using the standard algorithm to solve multi-step word problems.	✓	✓
Topic C	Decimal Multi-Digit Multiplication 5.NBT.7, 5.OA.1, 5.OA.2, 5.NBT.1		

Objective		INDEPENDENT DIGITAL LESSON	SMALL GROUP LESSON
Lesson 10	Multiply decimal fractions with tenths by multi-digit whole numbers using place value understanding to record partial products.	✓	✓
Lesson 11	Multiply decimal fractions by multi-digit whole numbers through conversion to a whole number problem and reasoning about the placement of the decimal.	✓	OPTIONAL
Lesson 12	Reason about the product of a whole number and a decimal with hundredths using place value understanding and estimation.	✓	✓ 
Topic D	Measurement Word Problems with Whole Number and Decimal Multiplication 5.NBT.5, 5.NBT.7, 5.MD.1, 5.NBT.1, 5.NBT.2		
Lesson 13	Use whole number multiplication to express equivalent measurements.	✓	✓
Lesson 14	Use fraction and decimal multiplication to express equivalent measurements.	✓	✓
Lesson 15	Solve two-step word problems involving measurement conversions.	✓	✓
Mid-Mission Assessment: Topics A-D			
Topic E	Mental Strategies for Multi-Digit Whole Number Division 5.NBT.1, 5.NBT.2, 5.NBT.6		
Lesson 16	Use <i>divide by 10</i> patterns for multi-digit whole number division.	✓	✓
Lesson 17	Use basic facts to approximate quotients with two-digit divisors.	✓	✓
Lesson 18	Use basic facts to approximate quotients with two-digit divisors.	✓	✓
Topic F	Partial Quotients and Multi-Digit Whole Number Division 5.NBT.6		
Lesson 19	Divide two- and three-digit dividends by multiples of 10 with single-digit quotients, and make connections to a written method.	✓	✓
Lesson 20	Divide two- and three-digit dividends by two-digit divisors with single-digit quotients, and make connections to a written method.	✓	✓

*Lesson 12 may take more than one small group rotation.

Objective		INDEPENDENT DIGITAL LESSON	SMALL GROUP LESSON
Lesson 21	Divide two- and three-digit dividends by two-digit divisors with single-digit quotients, and make connections to a written method.	✓	✓
Lesson 22	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.	✓	✓
Lesson 23	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.	✓	✓
Topic G	Partial Quotients and Multi-Digit Decimal Division 5.NBT.2, 5.NBT.7		
Lesson 24	Divide decimal dividends by multiples of 10, reasoning about the placement of the decimal point and making connections to a written method.	✓	✓
Lesson 25	Use basic facts to approximate decimal quotients with two-digit divisors, reasoning about the placement of the decimal point.	✓	✓
Lesson 26	Divide decimal dividends by two-digit divisors, estimating quotients, reasoning about the placement of the decimal point, and making connections to a written method.	✓	✓ 
Lesson 27	Divide decimal dividends by two-digit divisors, estimating quotients, reasoning about the placement of the decimal point, and making connections to a written method.	✓	OPTIONAL
Topic H	Measurement Word Problems with Multi-Digit Division 5.NBT.6, 5.NBT.7		
Lesson 28	Solve division word problems involving multi-digit division with group size unknown and the number of groups unknown.	✓	✓
Lesson 29	Solve division word problems involving multi-digit division with group size unknown and the number of groups unknown.	✓	✓
End-of-Mission Assessment: Topics E-H			

*Lesson 26 may take more than one small group rotation.

Foundational Missions

For each mission, Zearn Math highlights the foundational missions, the earlier content where concepts are introduced and developed. Teachers can access foundational missions directly from the mission page of their Teacher Account to address any gaps in prior knowledge. Zearn recommends that teachers assign foundational missions during Flex Day or during additional non-core instruction time. It is important to use a foundational mission to support a struggling student, rather than an unaligned mission, because the content students learn in each foundational mission supports their Core Day learning.

Foundational Missions for G5M2: G3M1 Multiply and Divide Friendly Numbers, G3M3 Multiply and Divide Tricky Numbers, G4M3 Multiply and Divide Big Numbers, G4M7 Multiply and Measure

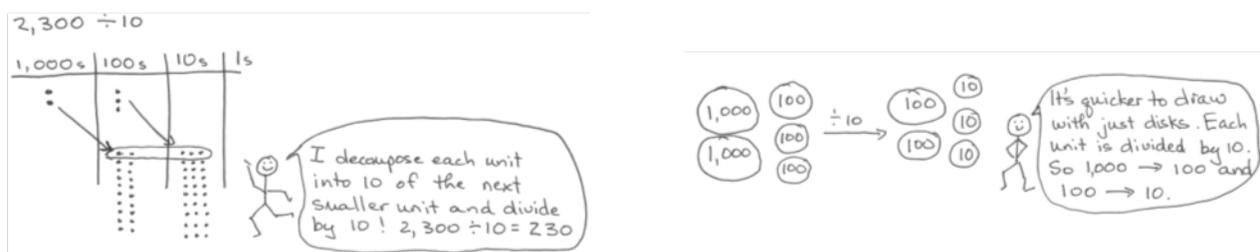
Mission Overview

In Mission 1, students explored the relationships of adjacent units on the place value chart to generalize whole number algorithms to decimal fraction operations. In Mission 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, for example, 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**).



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** lead 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 mission 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 mission, including refining their knowledge of place value, rounding, and estimation.

Topic A: Mental Strategies for Multi-Digit Whole Number Multiplication

LESSONS 1-2

Topic A begins a sequential study of multiplication that culminates in Topic D. In order to link prior learning from Grade 4 Mission 1 and Grade 5 Mission 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, for example, 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**).

Topic B: The Standard Algorithm for Multi-Digit Whole Number Multiplication

LESSONS 3-9

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.

Topic C: Decimal Multi-Digit Multiplication

LESSONS 10-12

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 Grade 5 Mission 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.

Topic D: Measurement Word Problems with Whole Number and Decimal Multiplication

LESSONS 13-15

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.

Topic E: Mental Strategies for Multi-Digit Whole Number Division

LESSONS 16-18

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 Lesson 17, $420 \div 60$ 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.

Topic F: Partial Quotients and Multi-Digit Whole Number Division

LESSONS 19-23

The series of lessons in Topic F lead 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**).

Topic G: Partial Quotients and Multi-Digit Decimal Division

LESSONS 24-27

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.

Topic H: Measurement Word Problems with Multi-Digit Division

LESSONS 28-29

In Topic H, students apply the work of the mission 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 mission, 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.

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 Symbols¹

- **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**

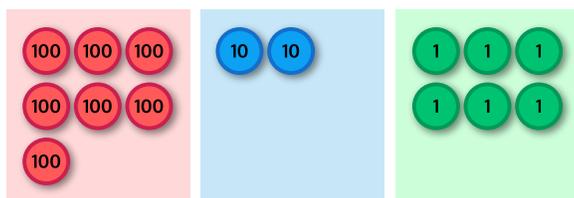
The number of times a number is to be used as a factor in a multiplication expression

¹ These are terms and symbols students have used or seen previously.

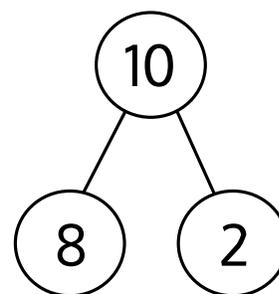
- **Multiple**
A number that can be divided by another number without a remainder like 15, 20, or any multiple of 5)
- **Pattern**
A systematically consistent and recurring trait within a sequence
- **Product**
The result of multiplying numbers together
- **Quotient**
The answer of dividing one quantity 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



Number Bond

- **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

Focus Grade Level Standards

Write and interpret numerical expressions.

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 $3 \times (18,932 + 921)$ is three times as large as $18,932 + 921$, without having to calculate the indicated sum or product.*

Understand the place value system.²

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.

Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.5

Fluently multiply multi-digit whole numbers using the standard algorithm.

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.³

Convert like measurement units within a given measurement system.

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.

² The balance of this cluster is addressed in Mission 1.

³ Focus on decimal multiplication of a single-digit whole number factor times a multi-digit number with up to two decimal places (e.g., 3×64.98). Restrict decimal division to a single digit whole number divisor with a multi-digit dividend with up to two decimal places (e.g., $64.98 \div 3$). The balance of the standard is taught in Mission 4.

Foundational Standards

4.OA.1

Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

4.OA.3

Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

4.NBT.4

Fluently add and subtract multi-digit whole numbers using the standard algorithm.

4.NBT.5

Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

4.NBT.6

Find whole-number quotients and remainders with up to four-digit dividends and one-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.

Focus Standards for Mathematical Practice

MP.1

Make sense of problems and persevere in solving them. Students make sense of problems when they use place value disks and area models to conceptualize and solve multiplication and division problems.

MP.2

Reason abstractly and quantitatively. Students make sense of quantities and their relationships when they use both mental strategies and the standard algorithms to multiply and divide multi-digit whole numbers. Students also *decontextualize* when they represent problems symbolically and *contextualize* when they consider the value of the units used and understand the meaning of the quantities as they compute.

MP.7

Look for and make use of structure. Students apply the *times 10, 100, 1,000* and the *divide by 10* patterns of the base ten system to mental strategies and the multiplication and division algorithms as they multiply and divide whole numbers and decimals.

MP.8

Look for and express regularity in repeated reasoning. Students express the regularity they notice in repeated reasoning when they apply the partial quotients algorithm to divide two-, three-, and four-digit dividends by two-digit divisors. Students also check the reasonableness of the intermediate results of their division algorithms as they solve multi-digit division word problems.