



## MISSION OVERVIEW

# Grade 5, Mission 1

## Place Value with Decimal Fractions

This opening Mission is a culmination of 2nd, 3rd, and 4th grade. Additionally, students extend their understanding of decimal fractions to the thousandths place and more sophisticated patterns of our base ten system.

### 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 (9)   SGL (9)		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
<b>Topic A</b>	<b>Multiplicative Patterns on the Place Value Chart</b> 5.NBT.1, 5.NBT.2, 5.MD.1		
Lesson 1	Reason concretely and pictorially using place value understanding to relate adjacent base ten units from millions to thousandths.	✓	✓
Lesson 2	Reason abstractly using place value understanding to relate adjacent base ten units from millions to thousandths.	✓	✓
Lesson 3	Use exponents to name place value units and explain patterns in the placement of the decimal point.	✓	✓
Lesson 4	Use exponents to denote powers of 10 with application to metric conversions.	✓	✓
<b>Topic B</b>	<b>Decimal Fractions and Place Value Patterns</b> 5.NBT.3		
Lesson 5	Name decimal fractions in expanded, unit, and word forms by applying place value reasoning.	✓	✓
Lesson 6	Compare decimal fractions to the thousandths using like units, and express comparisons with $>$ , $<$ , $=$ .	✓	✓
<b>Topic C</b>	<b>Place Value and Rounding Decimal Fractions</b> 5.NBT.4		
Lesson 7-8	Round a given decimal to any place using place value understanding and the vertical number line.	✓	✓
<b>Mid-Mission Assessment: Topics A-C</b>			
<b>Topic D</b>	<b>Adding and Subtracting Decimals</b> 5.NBT.2, 5.NBT.3, 5.NBT.7		
Lesson 9	Add decimals using place value strategies and relate those strategies to a written method.	✓	✓
Lesson 10	Subtract decimals using place value strategies and relate those strategies to a written method.	✓	✓

Objective		INDEPENDENT DIGITAL LESSON	SMALL GROUP LESSON
<b>Topic E</b>	<b>Multiplying Decimals</b> 5.NBT.2, 5.NBT.3, 5.NBT.7		
Lesson 11	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.	✓	✓
Lesson 12	Multiply a decimal fraction by single-digit whole numbers, including using estimation to confirm the placement of the decimal point.	✓	✓
<b>Topic F</b>	<b>Dividing Decimals</b> 5.NBT.3, 5.NBT.7		
Lesson 13	Divide decimals by single-digit whole numbers involving easily identifiable multiples using place value understanding and relate to a written method.	✓	✓
Lesson 14	Divide decimals with a remainder using place value understanding and relate to a written method.	✓	✓
Lesson 15	Divide decimals using place value understanding including remainders in the smallest unit.	✓	✓
Lesson 16	Solve word problems using decimal operations.	✓	✓
<b>End-of-Mission Assessment: Topics D-F</b>			

## 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 G5M1: G4M1 Add, Subtract, and Round, G4M6 Decimal Fractions**

## Mission Overview

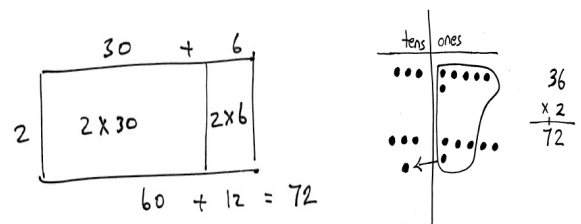
In Mission 1, students’ understandings of the patterns in the base ten system are extended from Grade 4’s work with place value to include decimals to the thousandths place. In Grade 5, students deepen their knowledge through a more generalized understanding of the relationships between and among adjacent 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 mission’s end, students apply these new understandings as they reason about and perform decimal operations through the hundredths place.

**Topic A** opens the mission 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  $10^3$  (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).

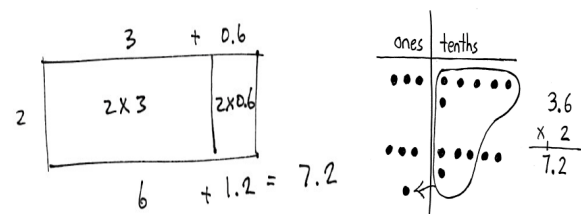
**Topic B** moves into the naming of decimal fraction numbers in expanded, unit (e.g.,  $4.23 = 4 \text{ ones } 2 \text{ tenths } 3 \text{ hundredths}$ ), and word forms and concludes with using like units to compare decimal fractions. Now, in Grade 5, students use exponents and the unit fraction to represent expanded form (e.g.,  $2 \times 102 + 3 \times (\frac{1}{10}) + 4 \times (\frac{1}{100}) = 200.34$ ) (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 Mission 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.,  $7 \text{ tens} + 8 \text{ tens} = 15 \text{ tens} = 150$  is analogous to  $7 \text{ tenths} + 8 \text{ tenths} = 15 \text{ tenths} = 1.5$ ).

**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 Mission 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 Mission 2.



The Mid-Mission Assessment follows Topic C. The End-of-Mission Assessment follows Topic F.

## Topic A: Multiplicative Patterns on the Place Value Chart

### LESSONS 1-4

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  $10 \times 10 \times 10$  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 =  $10^3$ ) (**5.NBT.2**). Conversions among metric units such as kilometers, meters, and centimeters give students 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**).

## Topic B: Decimal Fractions and Place Value Patterns

### LESSONS 5-6

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.,  $4,300.01 = 4 \times 10^3 + 3 \times 10^2 + 1 \times 10^0$ ). 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  $=$ ).

## Topic C: Place Value and Rounding Decimal Fractions

### LESSONS 7-8

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.

## Topic D: Adding and Subtracting Decimals

### LESSONS 9-10

Topics D through F mark a shift from the opening topics of Mission 1. From this point to the conclusion of the mission, 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.

## Topic E: Multiplying Decimals

### LESSONS 11-12

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.

## Topic F: Dividing Decimals

### LESSONS 13-16

Topic F concludes Mission 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 that 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 Mission 2. Students apply their accumulated knowledge of decimal operations to solve word problems at the close of the mission.

## 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

### Familiar Terms and Symbols<sup>1</sup>

- **>, <, =**  
Greater than, less than, equal to
- **Base ten units**  
Place value units

<sup>1</sup> These are terms and symbols students have used or seen previously.

- **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.,  $3.21 = 3 \text{ ones } 2 \text{ tenths } 1 \text{ hundredth}$
- **Word form**  
E.g., one hundred thirty-five

### 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.,  $3 + 4$ ,  $8 \times 3$ ,  $15 \div 3$  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.

## Suggested Tools and Representations

- **Number lines**

A variety of templates, including a large one for the back wall of the classroom

- **Personal white board**

- **Place value charts**

At least one per student for an insert in their personal board

- **Place value disks**

### Personal White Boards

- **Materials Needed for Personal White Boards**

- 1 heavy duty clear sheet protector
- 1 piece of stiff red tag board 11" × 8 ¼"
- 1 piece of stiff white tag board 11" × 8 ¼"
- 13" × 3" piece of dark synthetic cloth for an eraser (e.g., felt)
- 1 low odor blue dry erase marker, fine point

- **Directions for Creating Personal White Boards**

Cut your white and red tag to specifications. Slide into the sheet protector. Store your eraser on the red side. Store markers in a separate container to avoid stretching the sheet protector.

- **Suggestions for Use**

The white side of the board is the "paper." Students generally write on it, and if working individually, turn the board over to signal to the teacher that they have completed their work.

Templates such as place value charts, number bond mats, and number lines can be stored between the two pieces of tag board for easy access and reuse.

The tag board can be removed if necessary to project the work.

## Focus Grade Level Standards

### Understand the place value system.

#### 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 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.,  $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (\frac{1}{10}) + 9 \times (\frac{1}{100}) + 2 \times (\frac{1}{1000})$ .



- 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.4

Use place value understanding to round decimals to any place.

#### Perform operations with multi-digit whole numbers and with decimals to hundredths.<sup>2</sup>

#### 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.

#### 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.<sup>3</sup>

## Foundational Standards

#### 4.NBT.1

Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that  $700 \div 70 = 10$  by applying concepts of place value and division.*

#### 4.NBT.3

Use place value understanding to round multi-digit whole numbers to any place.

#### 4.NF.5

Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. (Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.) *For example, express  $\frac{3}{10}$  as  $\frac{30}{100}$ , and add  $\frac{3}{10} + \frac{4}{100} = \frac{34}{100}$ .*

#### 4.NF.6

Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite  $0.62$  as  $\frac{62}{100}$ ; describe a length as  $0.62$  meters; locate  $0.62$  on a number line diagram.*

#### 4.NF.7

Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols  $>$ ,  $=$ , or  $<$ , and justify the conclusions, e.g., by using a visual model.

#### 4.MD.1

Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times*

<sup>2</sup> The balance of this cluster is addressed in Mission 2.

<sup>3</sup> The focus in this mission is on the metric system to reinforce place value and writing measurements using mixed units. This standard is addressed again in later missions.

*as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*

#### 4.MD.2

Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

### Focus Standards for Mathematical Practice

#### MP.6

**Attend to precision.** Students express the units of the base ten system as they work with decimal operations, expressing decompositions and compositions with understanding (e.g., “9 hundredths + 4 hundredths = 13 hundredths. I can change 10 hundredths to make 1 tenth”).

#### MP.7

**Look for and make use of structure.** Students explore the multiplicative patterns of the base ten system when they use place value charts and disks to highlight the relationships between adjacent places. Students also use patterns to name decimal fraction numbers in expanded, unit, and word forms.

#### MP.8

**Look for and express regularity in repeated reasoning.** Students express regularity in repeated reasoning when they look for and use whole-number general methods to add and subtract decimals and when they multiply and divide decimals by whole numbers. Students also use powers of ten to explain patterns in the placement of the decimal point and generalize their knowledge of rounding whole numbers to round decimal numbers.