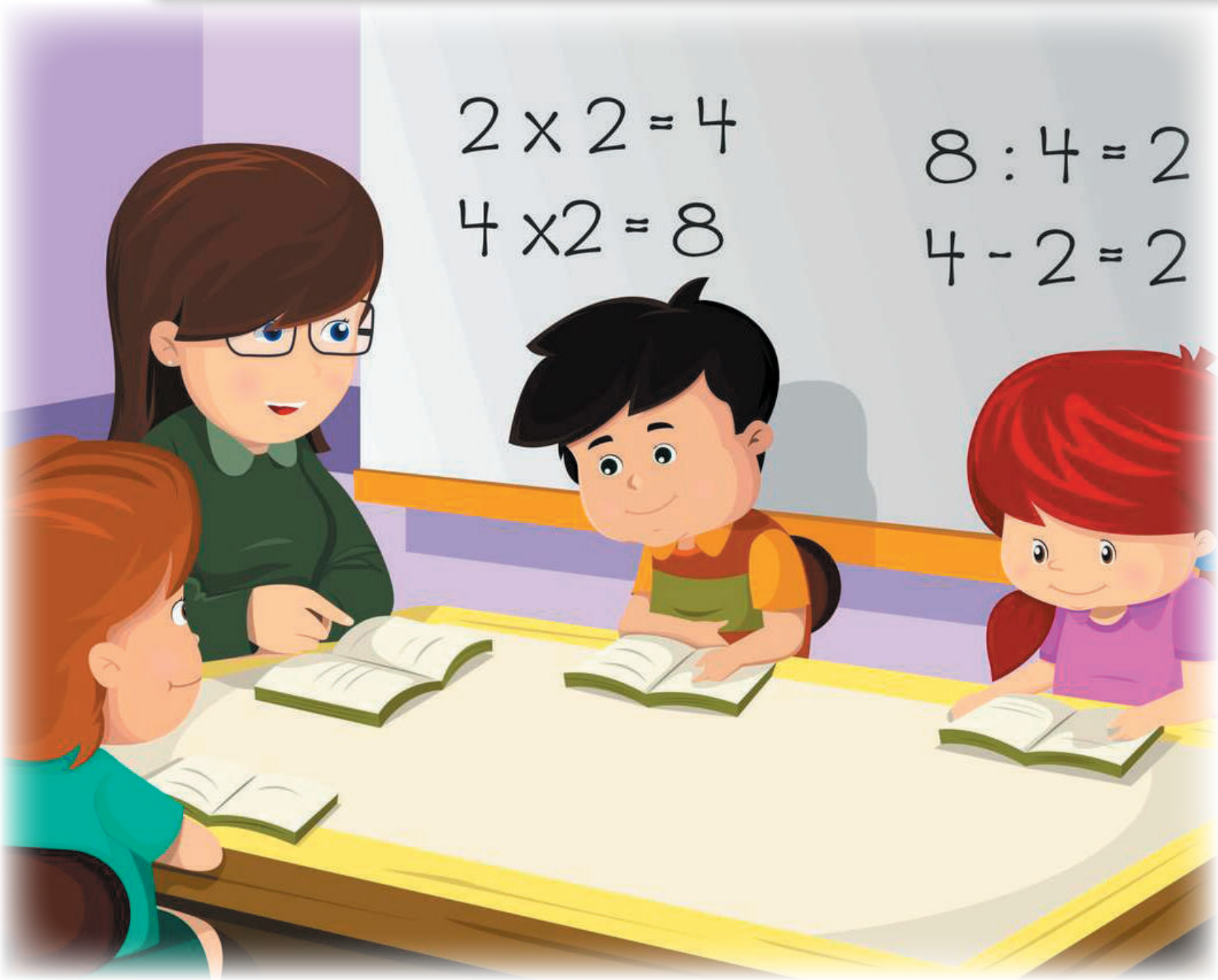




From Hundredths to Hundred- thousands

1	□	7	2
1	□	8	5

Teacher Guide



Creative Commons Licensing

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.



You are free:

- to Share**—to copy, distribute, and transmit the work
- to Remix**—to adapt the work

Under the following conditions:

Attribution—You must attribute the work in the following manner:
CKMath 6–8 was originally developed by Open Up Resources and authored by Illustrative Mathematics, <https://www.illustrativemathematics.org>, and is copyrighted as 2017–2019 by Open Up Resources. It is licensed under the Creative Commons Attribution 4.0 International License (CC BY 4.0). The Open Up Resources 6–8 Math Curriculum is available at: <https://www.openupresources.org/math-curriculum/>.

Adaptations and updates to the IM 6–8 Math English language learner supports and the additional English assessments marked as "B" are copyright 2019 by Open Up Resources and licensed under the Creative Commons Attribution 4.0 International License (CC BY 4.0).

Adaptations and updates to the IM K–8 Math Spanish translation of assessments marked as "B" are copyright 2019 by Illustrative Mathematics. These adaptations and updates are licensed under the Creative Commons Attribution 4.0 International License (CC BY 4.0).

This particular work is based on additional work of the Core Knowledge® Foundation (www.coreknowledge.org) made available through licensing under a Creative Commons Attribution-Non Commercial-Share Alike 4.0 International License. This does not in any way imply that the Core Knowledge Foundation endorses this work.

Noncommercial—You may not use this work for commercial purposes.

Share Alike—If you alter, transform, or build upon this work, you may distribute the resulting work only under the same or similar license to this one.

With the understanding that:

For any reuse or distribution, you must make clear to others the license terms of this work. The best way to do this is with a link to this web page:

<https://creativecommons.org/licenses/by-nc-sa/4.0/>

Copyright © 2023 Core Knowledge Foundation
www.coreknowledge.org

All Rights Reserved.

Core Knowledge®, Core Knowledge Curriculum Series™, Core Knowledge Math™ and CKMath™ are trademarks of the Core Knowledge Foundation.

Trademarks and trade names are shown in this book strictly for illustrative and educational purposes and are the property of their respective owners. References herein should not be regarded as affecting the validity of said trademarks and trade names.

From Hundredths to Hundred-thousands

Table of Contents

Introduction	i
Unit Overview	1
Section Overview	2
Center Overview	11
Lessons Plans and Student Task Statements:	
Section A: Lessons 1–5 Decimals with Tenths and Hundredths	20
Section B: Lessons 6–11 Place-value Relationships through 1,000,000	63
Section C: Lessons 12–17 Compare, Order, and Round	116
Section D: Lessons 18–23 Add and Subtract	176
Teacher Resources	229
Family Support Materials	
Assessments	
Cool Downs	
Instructional Masters	

1	,		7	2
1	,		8	5

From Hundredths to Hundred-thousands
Teacher Guide
Core Knowledge Mathematics™

Unit 4: From Hundredths to Hundred-thousands

At a Glance

Unit 4 is estimated to be completed in 24-25 days including 2 days for assessment.

This unit is divided into four sections including 22 lessons and 1 optional lesson.

- Section A—Decimals with Tenths and Hundredths (Lessons 1-5)
- Section B—Place-value Relationships through 1,000,000 (Lessons 6-11)
- Section C—Compare, Order, and Round (Lessons 12-17)
- Section D—Add and Subtract (Lessons 18-23)

On pages 9-10 of this Teacher Guide is a chart that identifies the section each lesson belongs in and the materials needed for each lesson.

This unit uses six new student centers.

- Rolling for Fractions
- Get Your Numbers in Order
- Greatest of Them All
- Mystery Number
- Tic Tac Round
- Number Puzzles: Addition and Subtraction

Unit 4: From Hundredths to Hundred-thousands

Unit Learning Goals

- Students read, write and compare numbers in decimal notation. They also extend place value understanding for multi-digit whole numbers and add and subtract within 1,000,000.

In this unit, students learn to express both small and large numbers in base ten, extending their understanding to include numbers from hundredths to hundred-thousands.

In previous units, students compared, added, subtracted, and wrote equivalent fractions for tenths and hundredths. Here, they take a closer look at the relationship between tenths and hundredths and learn to express them in decimal notation. Students analyze and represent fractions on square grids of 100 where the entire grid represents 1. They reason about the size of tenths and hundredths written as decimals, locate decimals on a number line, and compare and order them.

Students then explore large numbers. They begin by using base-ten blocks and diagrams to build, read, write, and represent whole numbers beyond 1,000. Students see that ten-thousands are related to thousands in the same way that thousands are related to hundreds, and hundreds are to tens, and tens are to ones.

As they make sense of this structure (MP7), students see that the value of the digit in a place represents ten times the value of the same digit in the place to its right.

Students then reason about the size of multi-digit numbers and locate them on number lines. To do so, they need to consider the value of the digits. They also compare, round, and order numbers through 1,000,000. They also use place-value reasoning to add and subtract numbers within 1,000,000 using the standard algorithm.

Throughout the unit, students relate these concepts to real-world contexts and use what they have learned to determine the reasonableness of their responses.

Section A: Decimals with Tenths and Hundredths

Standards Alignments

Addressing 4.NF.C, 4.NF.C.5, 4.NF.C.6, 4.NF.C.7

Building Towards 4.NF.C.6

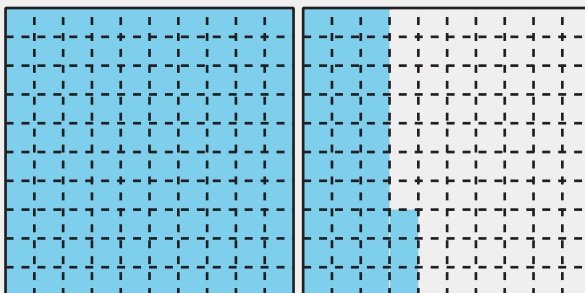
Section Learning Goals

- Represent, compare, and order decimals to the hundredths by reasoning about their size.
- Write tenths and hundredths in decimal notation.

Previously, students learned that there are 10 hundredths in 1 tenth and explored tenths and hundredths in fraction notation. In this section, they learn to represent and reason about tenths and fractions in decimal notation.

Students relate $\frac{1}{10}$ to the notation 0.1 and $\frac{1}{100}$ to 0.01. They learn to read 0.1 as “one tenth” and 0.01 as “one hundredth,” the same way these numbers are called when written in fraction notation. To see the connections between the fraction notation, decimal notation, and the word name, students reason with unit squares (representing 1) divided into hundredths.

The squares in this section are shaded from left to right, to reflect the digits in a decimal. For example, the number 1.33 is represented by shading a full square that represents 1, 3 columns in the next large square, and 3 small squares in the adjacent column.

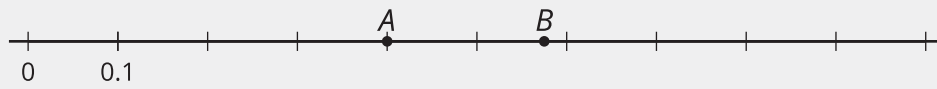


The structure of the unit square grid helps to illustrate the equivalence of $\frac{10}{100}$ and $\frac{1}{10}$. It also allows students to see that 0.10 is equivalent to 0.1, and to generalize it to other equivalent tenths and hundredths, for instance $0.20 = 0.2$ and $0.5 = 0.50$.

In these materials, decimals less than 1 are expressed with a leading zero. Consider explaining to students the zero is sometimes omitted and this doesn't impact the value of the decimal.

Later in the section, students use benchmarks such as 0.5 and the relationship between tenths and hundredths to locate and label decimals on a number line. They compare and order decimals based on

size and write comparison statements using the symbols $<$, $>$, and $=$.



   PLC: Lesson 3, Activity 1, Points on Number Lines

Suggested Centers

- Rolling for Fractions (3–5), Stage 1: Equivalent Fractions (Supporting)
- Get Your Numbers in Order (1–5), Stage 4: Denominators 2, 3, 4, 5, 6, 8, 10, 12, or 100 (Supporting)

Section B: Place-value Relationships through 1,000,000

Standards Alignments

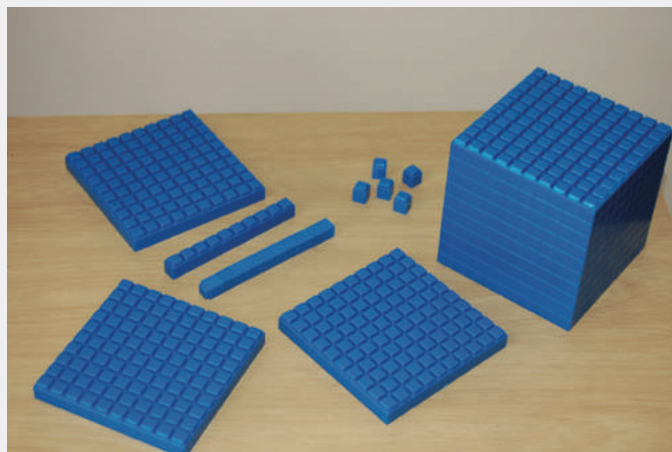
Addressing	4.NBT.A.1, 4.NBT.A.2, 4.NBT.B.4
Building Towards	4.NBT.A.1

Section Learning Goals

- Read, represent, and describe the relative magnitude of multi-digit whole numbers up to 1 million.
- Recognize that in a multi-digit whole number, the value of a digit in one place represents ten times what it represents in the place to its right.

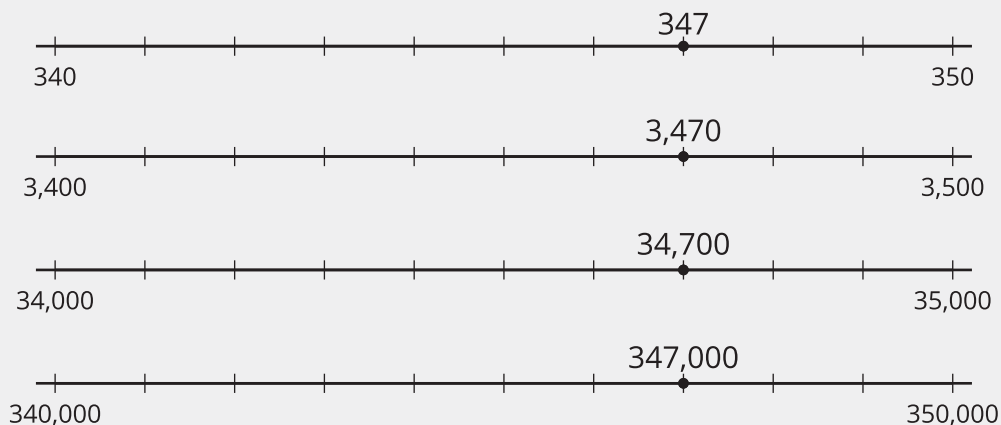
In this section, students make sense of whole numbers up to the hundred-thousands place, learn to read and write them, and deepen their understanding of place value.

Students begin by using base-ten blocks and diagrams to represent and reason about multi-digit numbers. They quickly see the limits of using base-ten blocks to represent large numbers when the smallest cube represents 1. For example, this collection represents 1,325. If the smallest block has a value of 10 or ten times as much, however, the same collection would represent 13,250. The reasoning here prepares them to think about place-value relationships.



As students analyze and draw base-ten diagrams and write multi-digit numbers in expanded form, they observe structure and begin to understand the value of the digit in each position (MP7). They see the “ten times” relationship between the value of a digit in one place and that of the same digit in a place to its right. For example, $300,000 = 10 \times 30,000$, so the 3 in 347,000 has a value ten times that of the 3 in 34,700.

Students also see this “ten times” relationship as they locate numbers on a number line. If the endpoints of a number line are each ten times those on another number line, points that are in the same position on the two number lines are related by a factor of 10 as well.



Students use these observations of structure to compare, order, and round numbers in the next section.

 ↔  PLC: Lesson 6, Activity 2, What is 10,000?

Suggested Centers

- Greatest of Them All (1–5), Stage 2: Three-digit Numbers (Supporting)
- Mystery Number (1–4), Stage 4: Fractions with Denominators 5, 8, 10, 12, 100 (Supporting)
- Greatest of Them All (1–5), Stage 3: Multi-digit Numbers (Addressing)
- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Supporting)

Section C: Compare, Order, and Round

Standards Alignments

Addressing	4.NBT.A.2, 4.NBT.A.3
Building Towards	4.NBT.A.3

Section Learning Goals

- Compare, order, and round multi-digit whole numbers within 1,000,000.

In grade 3, students compared, ordered, and rounded numbers within 1,000. In this section, they extend that work to include numbers within 1,000,000.

Students begin by placing multi-digit numbers on a number line with increasing levels of precision and then making comparisons. In comparing numbers, including those that are missing digits in some places, they make use of structure to determine the size of numbers and the significance of the value of the digits (MP7).

Is it possible to fill in the two blanks with the same digit to make:

$\boxed{4}\boxed{}, \boxed{3}\boxed{0}\boxed{0}$ less than $\boxed{3}\boxed{}, \boxed{4}\boxed{0}\boxed{0}$?

$\boxed{}\boxed{4}, \boxed{3}\boxed{0}\boxed{0}$ less than $\boxed{}\boxed{3}, \boxed{4}\boxed{0}\boxed{0}$?

Previously, students rounded numbers to the nearest multiple of 10 or 100. Here, they round numbers within 1,000,000 to the nearest multiples of 10, 100, 1,000, 10,000, and 100,000. When a number is exactly halfway between two consecutive multiples of 1,000, 10,000, or 100,000, they round up, following the convention used in grade 3 when rounding to the nearest multiple of 10 or 100.

Students apply their understanding of place value and rounding to solve contextual problems. They also engage in aspects of mathematical modeling as they consider the implications of rounding large numbers in different situations (MP4).

 PLC: Lesson 16, Activity 1, Round to What?

Suggested Centers

- Greatest of Them All (1–5), Stage 3: Multi-digit Numbers (Addressing)
- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Supporting)
- Mystery Number (1–4), Stage 5: Six-digit Numbers (Addressing)

Section D: Add and Subtract

Standards Alignments

Building On 4.NBT.A.1, 4.NBT.A.2

Addressing 4.NBT.A, 4.NBT.A.2, 4.NBT.B.4, 4.NF.B.3.c

Section Learning Goals

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

In grade 3, students used various representations and strategies to add and subtract within 1,000, including strategies that rely on place value. In this section, they build on those strategies while also learning about the standard algorithm for addition and subtraction. They begin working toward the end-of-grade expectation of fluency with addition and subtraction within 1,000,000.

As in earlier grades, students attend to the relationship between addition and subtraction, and find sums and differences by composing and decomposing numbers. They compare an algorithm that uses expanded form and the standard algorithm, and observe the role of place value in both algorithms.



$$\begin{array}{r}
 10,000 + 7,000 + 300 + 70 + 5 \\
 + 10,000 + 4,000 + 0 + 20 + 4 \\
 \hline
 20,000 + 11,000 + 300 + 90 + 9 = 31,399
 \end{array}$$

$$\begin{array}{r}
 1 \\
 17,375 \\
 + 14,024 \\
 \hline
 31,399
 \end{array}$$

Students start by finding sums that do not require composing a unit in any given place and progress towards those that require composing a unit multiple times.

Likewise, they start by subtracting numbers that don't require decomposing a unit and move towards differences that require multiple decompositions. Students practice adding and subtracting numbers both in and out of context.

$$\begin{array}{r}
 99 \\
 1 \cancel{10} \cancel{10} 15 \\
 \cancel{2}, \cancel{0}, \cancel{0} \cancel{5} \\
 \hline
 1,436 \\
 - 1,436 \\
 \hline
 569
 \end{array}$$

   PLC: Lesson 20, Activity 1, Add and Subtract Large Numbers

Suggested Centers

- Tic Tac Round (3–5), Stage 2: Any Place (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 6: Beyond 1,000 (Addressing)

Throughout the Unit

Throughout the unit, warm-up routines help students to make connections between previously learned concepts to the current concepts being developed. The Number Talk activities allow students to:

- leverage their knowledge of fractions to build their understanding of decimals,
- use the relationship between addition and subtraction to perform computation of multi-digit numbers, and
- relate the idea of composing and decomposing numbers to that of regrouping when using the standard algorithm for addition and subtraction.

Here is a sampling of Number Talk warm-ups in the unit.

lesson 5	lesson 16	lesson 19
$\frac{5}{10} + \frac{50}{100}$	$421 + \underline{\hspace{2cm}} = 500$	$2\frac{3}{4} - 1\frac{1}{4}$
$\frac{5}{10} + \frac{55}{100}$	$421 + \underline{\hspace{2cm}} = 1,000$	$1\frac{1}{4} - \frac{3}{4}$
$\frac{6}{10} + \frac{50}{100}$	$6,421 + \underline{\hspace{2cm}} = 7,000$	$5\frac{1}{8} - 2\frac{3}{8}$
$\frac{6}{10} + \frac{65}{100}$	$6,421 + \underline{\hspace{2cm}} = 10,000$	$3\frac{2}{10} - 2\frac{7}{10}$

The True or False activities also enable students to revisit concepts from prior units and grades in support of current work. Problems involving fraction equivalence support the work of comparing decimals. Problems involving expanded form prompt students to tend to the value of the digits when learning new place values and using the standard algorithm.

Here is a sampling of True or False warm-ups in the unit.

lesson 2	lesson 9	lesson 22
$\frac{50}{100} = \frac{5}{10}$	$4,000 + 600 + 70,000 = 70,460$	$7,000 + 3,000 = 10,000$
$\frac{20}{10} = \frac{20}{100}$	$900,000 + 20,000 + 3,000 = 920,000 + 3,000$	$7,180 + 3,920 = 10,100$
$2 = 1 + \frac{90}{100}$	$80,000 + 800 + 8,000 = 800,000 + 80 + 8$	$423,450 - 42,345 = 105$
$3\frac{1}{10} = \frac{31}{10}$		$400,000 - 99,999 = 311,111$

Materials Needed

LESSON	GATHER	COPY
A.1	<ul style="list-style-type: none"> Colored pencils 	<ul style="list-style-type: none"> none
A.2	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> Card Sort: Diagrams of Fractions & Decimals (groups of 2)
A.3	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> none
A.4	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> none
A.5	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> Order Once, Order Twice (groups of 2)
B.6	<ul style="list-style-type: none"> Base-ten blocks 	<ul style="list-style-type: none"> Build Numbers (1-5 Digit Cards) (groups of 4) 10-by-10 Square Grids (groups of 1)
B.7	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> none
B.8	<ul style="list-style-type: none"> Base-ten blocks 	<ul style="list-style-type: none"> none
B.9	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> Card Sort: Large Numbers (4 to 6 digits) (groups of 2)
B.10	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> none
B.11	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> none
C.12	<ul style="list-style-type: none"> Materials from a previous activity Number cards 0-10 	<ul style="list-style-type: none"> none
C.13	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> none
C.14	<ul style="list-style-type: none"> Stickers Sticky notes 	<ul style="list-style-type: none"> On Which Line Do They Belong? (0-700,000 number line) (groups of 30)
C.15	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> none
C.16	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> none

C.17	● none	● none
D.18	● Grid paper	● none
D.19	● Grid paper	● none
D.20	● Grid paper	● none
D.21	● Grid paper	● none
D.22	● Grid paper	● 0-9 Digit Cards (groups of 2)
D.23	● none	● none

Center: Rolling for Fractions (3–5)

Stage 1: Equivalent Fractions

Lessons

- Grade4.4.A1 (supporting)
- Grade4.4.A2 (supporting)
- Grade4.4.A3 (supporting)
- Grade4.4.A4 (supporting)
- Grade4.4.A5 (supporting)

Stage Narrative

One player rolls 6 number cubes and tries to use 4 of them to fill in a statement with 2 equivalent fractions. If the player cannot make a true statement, they can re-roll as many of the cubes as they like. Each player may re-roll twice. If the student can fill in a statement with 2 equivalent fractions, they get a point for the round. Students take turns for 6 rounds and the player with the most points at the end of the game wins.

Standards Alignments

Addressing 3.NF.A.3.b

Materials to Gather

Number cubes

Materials to Copy

Rolling for Fractions Stage 1 Recording Sheet
(groups of 1)

Additional Information

Each group of 2 needs 6 number cubes.

Stages used in Grade 3

Stage 1

Addressing

- Grade3.5.C
- Grade3.5.D

Center: Get Your Numbers in Order (1–5)

Stage 4: Denominators 2, 3, 4, 5, 6, 8, 10, 12, or 100

Lessons

- Grade4.4.A1 (supporting)
- Grade4.4.A2 (supporting)
- Grade4.4.A3 (supporting)
- Grade4.4.A4 (supporting)
- Grade4.4.A5 (supporting)

Stage Narrative

Students choose cards with fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100. Students write their number in any space on the board, as long as the numbers from left to right go from least to greatest. If students cannot place their number, they get a point. The player with the fewest points when the board is filled is the winner.

Standards Alignments

Addressing 4.NF.A.2

Materials to Gather

Dry erase markers, Sheet protectors

Materials to Copy

Fraction Cards Grade 3 (groups of 2), Fraction Cards Grade 4 (groups of 2), Get Your Numbers in Order Stage 3 and 4 Gameboard (groups of 2)

Center: Greatest of Them All (1–5)

Stage 2: Three-digit Numbers

Lessons

- Grade4.4.B6 (supporting)
- Grade4.4.B7 (supporting)
- Grade4.4.B8 (supporting)

Stage Narrative

Students make three-digit numbers.

Variation:

Students try to make the number with the least value.

Standards Alignments

Addressing 2.NBT.A

Materials to Gather

Number cards 0–10

Materials to Copy

Greatest of Them All Stage 2 Recording Sheet
(groups of 1)

Stage 3: Multi-digit Numbers

Lessons

- Grade4.4.B9 (addressing)
- Grade4.4.B10 (addressing)
- Grade4.4.B11 (addressing)
- Grade4.4.C12 (addressing)
- Grade4.4.C13 (addressing)
- Grade4.4.C14 (addressing)
- Grade4.4.C15 (addressing)

Stage Narrative

Students make six-digit numbers.

Variation:

Students try to make the number with the least value.

Standards Alignments

Addressing 4.NBT.A.2

Materials to Gather

Number cards 0–10

Materials to Copy

Greatest of Them All Stage 3 Recording Sheet
(groups of 1)

Center: Mystery Number (1–4)

Stage 4: Fractions with Denominators 5, 8, 10, 12, 100

Lessons

- Grade4.4.B6 (supporting)
- Grade4.4.B7 (supporting)
- Grade4.4.B8 (supporting)
- Grade4.4.B9 (supporting)
- Grade4.4.B10 (supporting)

Stage Narrative

Students choose a mystery fraction (with a denominator of 5, 8, 10, 12, or 100) from the gameboard. Students give clues based on the given vocabulary.

Standards Alignments

Addressing 4.NF.A

Materials to Copy

Mystery Number Stage 4 Gameboard (groups of 2)

Stage 5: Six-digit Numbers

Lessons

- Grade4.4.C16 (addressing)
- Grade4.4.C17 (addressing)

Stage Narrative

Students choose a mystery number (up to six digits) from the gameboard. Students give clues using the given vocabulary.

Standards Alignments

Addressing 4.NBT.A

Materials to Copy

Mystery Number Stage 5 Gameboard (groups of 2)

Stages used in Grade 3

Stage 2

Supporting

- Grade3.5.A

Stage 3

Addressing

- Grade3.5.A
- Grade3.5.B

Center: Tic Tac Round (3–5)

Stage 1: Nearest Ten or Hundred

Lessons

- Grade4.4.B11 (supporting)
- Grade4.4.C12 (supporting)
- Grade4.4.C13 (supporting)
- Grade4.4.C14 (supporting)
- Grade4.4.C15 (supporting)
- Grade4.4.C16 (supporting)
- Grade4.4.C17 (supporting)

Stage Narrative

Students remove the cards that show 10 before they start. Then they choose three number cards and make a three-digit number. They spin the spinner to get a place value to round to. Students write their number in any space on the board, each partner using a different color. The first player to get three in a row wins.

Standards Alignments

Addressing 3.NBT.A.1

Materials to Gather

Colored pencils, crayons, or markers, Number cards 0–10, Paper clips

Materials to Copy

Tic Tac Round Stage 1 Gameboard (groups of 2),
Tic Tac Round Stage 1 Spinner (groups of 2)

Stage 2: Any Place

Lessons

- Grade4.4.D18 (addressing)
- Grade4.4.D19 (addressing)
- Grade4.4.D20 (addressing)

Stage Narrative

Students remove the cards that show 10 before they start. Then they choose six number cards and make a six-digit number. They spin the spinner to get a place value to round to. Students write their number in any space on the board, each partner using a different color. The first player to get three in a row wins.

Standards Alignments

Addressing 4.NBT.A.3

Materials to Gather

Colored pencils, crayons, or markers, Number cards 0–10, Paper clips

Materials to Copy

Tic Tac Round Stage 2 Gameboard (groups of 2),
Tic Tac Round Stage 2 Spinner (groups of 2)

Stages used in Grade 3

Stage 1

Addressing

- Grade3.3.D

Center: Number Puzzles: Addition and Subtraction (1–4)

Stage 6: Beyond 1,000

Lessons

- Grade4.4.D18 (addressing)
- Grade4.4.D19 (addressing)
- Grade4.4.D20 (addressing)

Stage Narrative

Students use the digits 0–9 to make addition equations true. They work with sums and differences beyond 1,000.

Standards Alignments

Addressing 4.NBT.B.4

Materials to Copy

Number Puzzles Addition and Subtraction Stage 6
Recording Sheet (groups of 1)

Stages used in Grade 3

Stage 5

Addressing

- Grade3.3.B
- Grade3.3.D

Supporting

- Grade3.3.B
- Grade3.6.C
- Grade3.6.D

Section A: Decimals with Tenths and Hundredths

Lesson 1: Decimal Numbers

Standards Alignments

Addressing	4.NF.C.6
Building Towards	4.NF.C.6

Teacher-facing Learning Goals

- Make sense of tenths and hundredths in decimal notation using unit square grids.

Student-facing Learning Goals

- Let's learn about decimals.

Lesson Purpose

The purpose of this lesson is for students to make sense of tenths and hundredths in decimal notation.

In previous units, students reasoned about the size of fractions, compared them, and wrote equivalent fractions. They performed some operations: multiplying fractions by whole numbers, and adding and subtracting fractions with the same denominator including fractions with denominators of 10 and 100. Students also used their understanding of equivalent fractions to add tenths and hundredths.

In this lesson, students rely on their knowledge of fractions to express tenths and hundredths as **decimals**. They begin to see connections between fraction notation, the names of fractions in words, and decimal notation. They also start to notice the structure of the decimal notation and how it relates to place value. Students use increasingly precise language to read decimals through this section (MP6). Students will develop this new understanding over several lessons, so they are not expected to name the value of each place of a decimal at this time.

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR2 (Activity 2)

Instructional Routines

Notice and Wonder (Warm-up)

Materials to Gather

- Colored pencils: Activity 1, Activity 2

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

How readily did students make connections between the fraction notation and decimal notation of tenths and hundredths? How did the use of square grids support the range of learners in making connections?

Cool-down (to be completed at the end of the lesson)

🕒 5 min

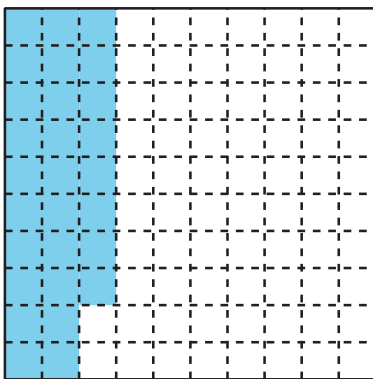
What Does It Represent?

Standards Alignments

Addressing 4.NF.C.6

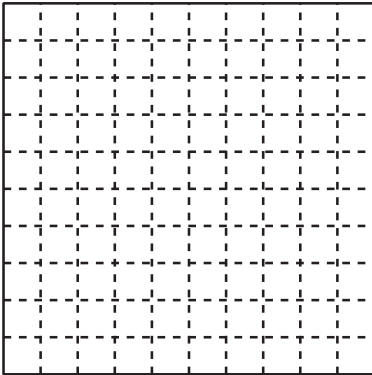
Student-facing Task Statement

- The large square represents 1.



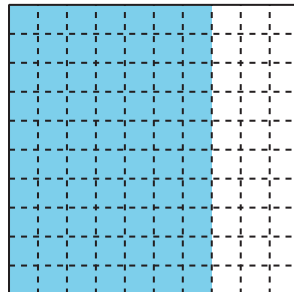
- What fraction does the shaded portion represent?
- Write the fraction as a decimal.

- The large square represents 1. Shade the diagram to represent 0.7.



Student Responses

- a. $\frac{28}{100}$
b. 0.28
- Sample response:



Begin Lesson

Warm-up

⌚ 10 min

Notice and Wonder: Shaded Grid

Standards Alignments

Building Towards 4.NF.C.6

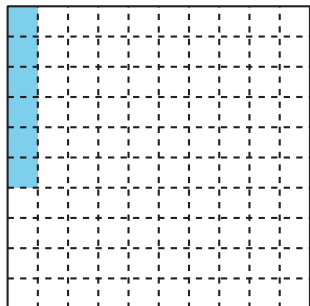
The purpose of this warm-up is to elicit the use of a square grid to represent fractions in hundredths. Both the representation and the fractions will be useful later in the lesson, when students write fractions as decimals. While students may notice and wonder many things about the diagram, focus on expressing the fractions of the large square that are shaded and unshaded.

Instructional Routines

Notice and Wonder

Student-facing Task Statement

What do you notice? What do you wonder?



Student Responses

Students may notice:

- There is a 10-by-10 square grid with some part of it shaded.
- There are 100 small squares in a large square.
- Six of the little squares are shaded and 94 are not.
- $\frac{6}{100}$ of the square is shaded.

Students may wonder:

- What does the shaded portion represent or mean?
- Does the large square represent 1?
- Why is most of the grid not shaded?
- How many different ways are there to show $\frac{6}{100}$ on the grid?

Launch

- Groups of 2
- Display the image.
- “What do you notice? What do you wonder?”
- 1 minute: quiet think time

Activity

- “Discuss your thinking with your partner.”
- 1 minute: partner discussion
- Share and record responses.

Synthesis

- “If the large square represents 1, what fraction of it is shaded? What fraction is not shaded? How do you know?” ($\frac{6}{100}$ are shaded. There are 100 small squares, and 6 of them shaded and 94 are not.)

Activity 1

Shady Fractions

🕒 20 min

Standards Alignments

Addressing 4.NF.C.6

In this activity, students use a square grid of 100 to revisit the meaning of tenths and hundredths and to make sense of the decimal notation for these fractions. They begin to make connections between the familiar representations of a fraction—using a diagram, fraction notation, and words—and the newly introduced decimal notation, and to notice similarities in their structure (MP2, MP7). It is important for students to consistently hear numbers read as decimals, for example 1.7 as one and 7 tenths so that they can connect decimal notation to visual representations and fraction notation. Later, in the lesson synthesis, the connections between the decimal notation and numbers in base-ten will begin to be made explicit.

Students may begin to notice that there are different ways to write decimals that represent the same fraction. It is not essential to discuss this in depth, as students will look at equivalent decimals more closely in upcoming activities.

Access for Students with Disabilities

Representation: Develop Language and Symbols. Some students may need additional examples before writing fractions in decimal notation independently. To emphasize connections between representations, create a two-column table with examples of tenths and hundredths in both decimal and word form on each side. This might include 0.04 (4 hundredths), 0.25 (25 hundredths), and 0.50 (50 hundredths) on one side and 0.4 (4 tenths), 0.2 (2 tenths), and 0.5 (5 tenths) on the other. Invite students to notice patterns. Check for understanding by asking students how they would write 7 hundredths, 70 hundredths, and 7 tenths in decimal notation. *Supports accessibility for: Visual-Spatial Processing, Organization, Attention*

Materials to Gather

Colored pencils

Student-facing Task Statement

Each large square represents 1.

1. What fraction do the shaded parts of each diagram represent? For the last square, shade in some parts and name the fraction it represents.

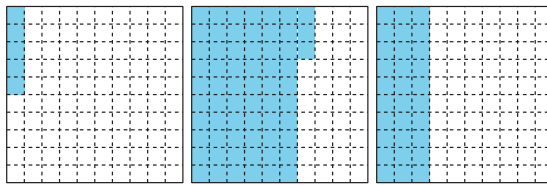
a. b. c.

Launch

- Groups of 2
- Give students access to colored pencils.

Activity

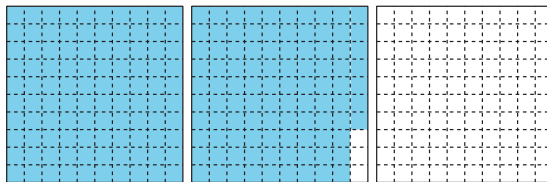
- “Work on the first problems independently.”
- 3–4 minutes: independent work time



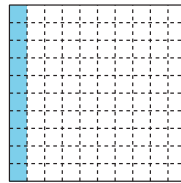
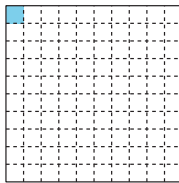
d.

e.

f.



2. The shaded part of this diagram represents 0.01 or “1 hundredth.”
- The shaded parts of this diagram represent 0.10 or “10 hundredths.” They also represent 0.1 or “1 tenth.”

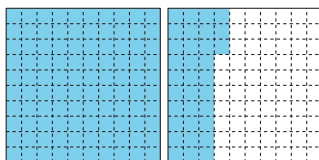


Numbers like 0.01, 0.10, and 0.1 are written as **decimals**.

Look at the shaded parts of each diagram in the first problem. Write the numbers they represent as decimals.

3. What fraction and decimal do the shaded parts of each diagram represent?

a.

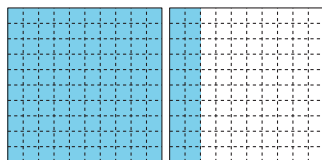


b.

- Pause for a brief whole-class discussion. Display the diagrams in the first problem.
- “What notation can we write to show each fraction? How do we say the fraction in words?”
- Record students’ responses in both notation and words.
- Display the diagrams of one hundredth and one tenth (in the next problem). Explain that the first fraction, $\frac{1}{100}$, can also be expressed as 0.01 and is still read “1 hundredth”. This form of writing is called decimal notation.
- “What about $\frac{9}{100}$?” (nine hundredths, 0.09) “ $\frac{10}{100}$?” (ten hundredths, 0.10)
- “We know that $\frac{10}{100}$ can also be expressed as $\frac{1}{10}$. How do we say it in words and write it in decimal notation?” (one tenth, 0.1)
- “In the numbers written like 0.1 and 0.01, there are decimal points. The digit to the left of the decimal point is in the ones place. The 0 means that there are no ones.”
- “Now try writing the fractions from the first problem as decimals. Then, complete the rest of the activity.”
- 5–6 minutes: independent or partner work time
- Monitor for the ways students write the fractions in the last problem, which may inform how they write corresponding decimals. For instance, they may write:
 - mixed numbers ($1\frac{20}{100}$)
 - sums ($\frac{100}{100} + \frac{20}{100}$ or $1 + \frac{20}{100}$)
 - fractions with no whole numbers ($\frac{120}{100}$)

Synthesis

- Invite students to share the decimals for



Student Responses

1.
 - a. $\frac{5}{100}$
 - b. $\frac{63}{100}$
 - c. $\frac{30}{100}$ or $\frac{3}{10}$
 - d. 1 or $\frac{100}{100}$
 - e. $\frac{97}{100}$
 - f. Answers vary.
2.
 - a. 0.05
 - b. 0.63
 - c. 0.3 or 0.30
 - d. 1 or 1.00
 - e. 0.97
 - f. Answers vary.
3.
 - a. Fraction: $1\frac{33}{100}$ (or equivalent).
Decimal: 1.33
 - b. Fraction: $1\frac{20}{100}$ or $1\frac{2}{10}$ (or equivalent).
Decimal: 1.20 or 1.2

the diagrams in the first problem. Record their responses for all to see.

- “How are the diagrams in the last problem different from those in the first problem?” (They represent numbers greater than 1.)
- “How did you figure out how to write each fraction as a decimal?”
- If not mentioned in students’ responses, point out that we can think of $1\frac{20}{100}$ as $1 + \frac{20}{100}$. The 1 whole goes in the ones place, to the left of the decimal point, and the 20 hundredths goes on the right of the decimal point.
- “The decimal 1.20 can be read ‘one and 20 hundredths’. The decimal 1.33 can be read ‘one and 33 hundredths.’”

Advancing Student Thinking

Students may write only fractions for the last problem as $\frac{120}{100}$ and $\frac{133}{100}$. Ask them to try expressing them as mixed numbers, and see how doing so might help with the decimal notation.

Activity 2

🕒 15 min

Ways to Express a Number

Standards Alignments

Addressing 4.NF.C.6

In this activity, students practice representing and writing decimals given another representation (fraction notation or a diagram). The idea that two decimals can be equivalent, just like two fractions can be equivalent, is made explicit here. When students make connections between quantities in word form, decimal form, and fraction form, they reason abstractly and quantitatively (MP2).

Access for English Learners

MLR2 Collect and Display. Synthesis: Direct attention to words collected and displayed from the previous activity. Invite students to borrow language from the display as needed, and update it throughout the lesson.

Advances: Conversing, Reading

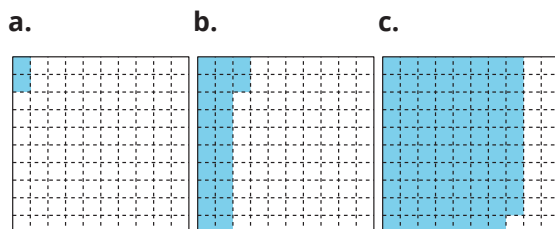
Materials to Gather

Colored pencils

Student-facing Task Statement

Each large square represents 1.

- Write a fraction and a decimal that represent the shaded parts of each diagram. Then, write each amount in words.



- Shade each diagram to represent each given fraction or decimal.

a. b. c.

Launch

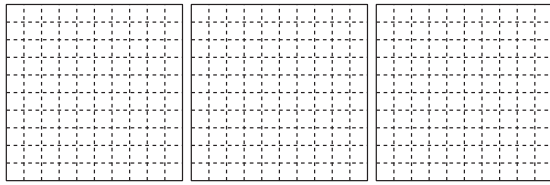
- Groups of 2
- Give students access to colored pencils.
- “Let’s practice representing amounts using diagrams, fractions, and decimals.”

Activity

- “Take a few quiet minutes to work on the activity. Then, share your responses with your partner.”
- 7–8 minutes: independent work time
- 3–4 minutes: partner discussion
- Monitor for students who use the idea of equivalent fractions to explain why 0.6 and 0.60 refer to the same amount.

Synthesis

- Ask students to use words and decimal



Fraction: _____

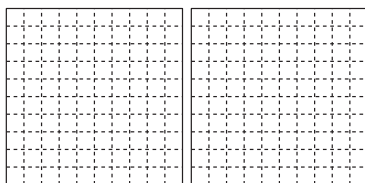
Fraction: $\frac{8}{10}$ Fraction: $\frac{55}{100}$

Decimal: 0.78

Decimal: _____

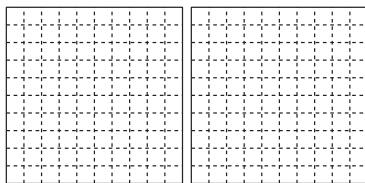
Decimal: _____

d.

Fraction: $\frac{107}{100}$

Decimal: _____

e.

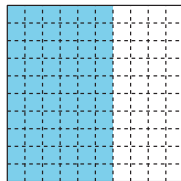


Fraction: _____

Decimal: 1.6

3. Han and Elena disagree about what number the shaded portion represents.

Han says that it represents 0.60 and Elena says it represents 0.6.



Explain why both Han and Elena are correct.

Student Responses

1.
 - a. $\frac{2}{100}$, 0.02, two hundredths
 - b. $\frac{22}{100}$, 0.22, twenty-two hundredths
 - c. $\frac{79}{100}$, 0.79, seventy-nine hundredths
2.
 - a. Diagram shows 78 small squares shaded. Fraction: $\frac{78}{100}$

notation to express each amount in the first problem.

- Clarify that 0.02 can be named “two hundredths” and 0.22 can be named “twenty-two hundredths” and so on.
- Select students to share their representations for $\frac{107}{100}$ and 1.6 and how they reasoned about them.
- Display 1.07 and 1.6. “How would you say these decimals in words?” (One and seven hundredths or one point zero seven for 1.07, and one and sixth tenths or one point six for 1.6.)

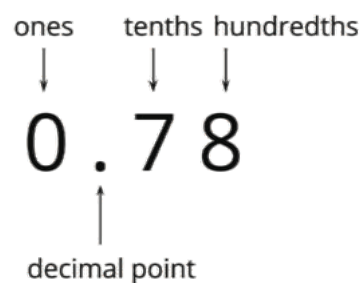
- b. Diagram shows 80 small squares shaded. Decimal: 0.80 or 0.8
- c. Diagram shows 55 small squares shaded. Decimal: 0.55
- d. Diagram shows one entire large square (100 small squares) and 7 small squares shaded. Decimal: 1.07
- e. Diagram shows one entire large square (100 small squares) and 60 small squares shaded. Fraction: $1\frac{6}{10}$ or $1\frac{60}{100}$ (or equivalent)
3. Sample response: 0.6 is 6 tenths and 0.60 is 60 hundredths and the two are equivalent.

Lesson Synthesis

🕒 10 min

“Today we learned that a fraction can be written as a decimal, regardless of whether it is less or greater than 1.”

Display the number 0.78. Ask students to identify what each digit represents. Annotate the numbers as shown. (Note that students are not expected to do this independently at this time.)



“Why might it make sense to name this decimal seventy-eight hundredths?” (Seven tenths and 8 hundredths is equivalent to 78 hundredths.)

Display the numbers 0.6 and 0.60.

“How do we say these numbers in words?” (Six tenths for 0.6, and sixty hundredths for 0.60)

“In both numbers, what does the 0 to the left of the decimal point represent?” (Zero ones)

“In 0.6, what does the 6 represent?” (Six tenths)

“In 0.60, what does the 60 represent?” (Sixty hundredths)

“Why can we use the same diagram to represent 0.6 and 0.60?” (They represent the same amount. Six tenths is equivalent to sixty hundredths, so 0.6 and 0.60 are equivalent.)

Reiterate that the decimal point separates the whole number and the fractional amount.

Suggested Centers

- Rolling for Fractions (3–5), Stage 1: Equivalent Fractions (Supporting)
- Get Your Numbers in Order (1–5), Stage 4: Denominators 2, 3, 4, 5, 6, 8, 10, 12, or 100 (Supporting)

Complete Cool-Down

Response to Student Thinking

For the last problem, students may shade 7 small squares (instead of 70 small squares) to represent 0.7.

Next Day Support

- Launch Activity 1 with a discussion about this cool-down.

Lesson 2: Equivalent Decimals

Standards Alignments

Addressing 4.NF.C.5, 4.NF.C.6, 4.NF.C.7

Teacher-facing Learning Goals

- Reason about equivalent tenths and hundredths in decimal notation.

Student-facing Learning Goals

- Let's think about equivalent decimals.

Lesson Purpose

The purpose of this lesson is for students to reason about equivalent tenths and hundredths in decimal notation.

Previously, students learned to represent tenths and hundredths shaded on a grid as decimals and fractions. They continue to build their understanding of decimals in this lesson and take a closer look at decimals that are equivalent (for example, 0.2 and 0.20). They articulate why the same value can be expressed in two different ways. They also encounter decimals in equations and on number lines, and use these representations to reason about equivalence.

Access for:

Students with Disabilities

- Representation (Activity 1)

Instructional Routines

Card Sort (Activity 1), MLR1 Stronger and Clearer Each Time (Activity 2), True or False (Warm-up)

Materials to Copy

- Card Sort: Diagrams of Fractions & Decimals (groups of 2): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	15 min

Teacher Reflection Question

Which students did you not hear from today? Review your class list and try to recall something each student did or said. Make note of the students you missed. How will you bring their

Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

voices into the lesson tomorrow?

Cool-down (to be completed at the end of the lesson)

🕒 5 min

Equal or Not Equal?

Standards Alignments

Addressing 4.NF.C.7

Student-facing Task Statement

- Select **all** the statements that are true.
 - $0.2 = 0.20$
 - $5.40 = 5.04$
 - $1.30 = 1.3$
 - $0.07 = 0.70$
 - $2.05 = 2.5$
- Which of these numbers is equivalent to 0.9? Explain how you know they are equivalent.
 - 0.09
 - 0.90
 - 9.0
 - 9.09

Student Responses

- A and C
- B. 0.90. Sample response: 0.9 is $\frac{9}{10}$, which is equivalent to $\frac{90}{100}$. $\frac{90}{100}$ written as a decimal is 0.90.

----- Begin Lesson -----

Warm-up

 10 min

True or False: Equivalent Fractions

Standards Alignments

Addressing 4.NF.C.5

The purpose of this True or False is to revisit equivalent fractions in tenths and hundredths. The reasoning students do here will be helpful later when students make sense of and identify decimals that are equivalent to given fractions or given decimals.

Instructional Routines

True or False

Student-facing Task Statement

Decide whether each statement is true or false. Be prepared to explain your reasoning.

- $\frac{50}{100} = \frac{5}{10}$
- $\frac{20}{10} = \frac{20}{100}$
- $2 = 1 + \frac{90}{100}$
- $3\frac{1}{10} = \frac{31}{10}$

Student Responses

Sample responses:

- True, because 50 hundredths and 5 tenths are both $\frac{1}{2}$.
- False, because $\frac{20}{10}$ is 2 and $\frac{20}{100}$ is less than 1.
- False, because $1 + \frac{90}{100}$ is $1\frac{90}{100}$, which is less than 2.
- True, because $3 + \frac{1}{10}$ is $\frac{30}{10} + \frac{1}{10}$, which is equal to $\frac{31}{10}$.

Launch

- Display one statement.
- “Give me a signal when you know whether the statement is true and can explain how you know.”
- 1 minute: quiet think time

Activity

- Share and record answers and strategy.
- Repeat with each statement.

Synthesis

- “What do you know about the relationship of tenths and hundredths that helped you decide whether each statement is true or false?” (Sample responses:
 - One tenth is 10 hundredths.
 - One tenth is 10 times 1 hundredth.
 - There are 10 tenths in 1 whole.
 - There are 100 hundredths in 1 whole.
 - If we multiply the numerator and denominator of a fraction in tenths by 10, we get an equivalent fraction in hundredths.)

Activity 1

🕒 15 min

Card Sort: Diagrams of Fractions and Decimals

Standards Alignments

Addressing 4.NF.C.6

In this activity, students reinforce their understanding of equivalent fractions and decimals by sorting a set of cards by their value. The cards show fractions, decimals, and diagrams. A sorting task gives students opportunities to analyze different representations closely and make connections (MP2, MP7).

♿ Access for Students with Disabilities

Representation: Access for Perception. Synthesis: Display a 10-by-10 grid, as well as a square of the exact same size, but with only the columns shown (therefore representing just tenths). Shade 20 hundredths on the 10-by-10 grid and write 0.20 (twenty hundredths) above it. Shade 2 tenths on the other square and write 0.2 (2 tenths) above it. Invite students to discuss how these diagrams demonstrate equivalence of the two numbers.

Supports accessibility for: Conceptual Processing, Visual-Spatial Processing

Instructional Routines

Card Sort

Materials to Copy

Card Sort: Diagrams of Fractions & Decimals
(groups of 2)

Required Preparation

- Create a set of cards from the Instructional master for each group of 2–4.

Student-facing Task Statement

Your teacher will give you a set of cards. Each large square on the cards represents 1.

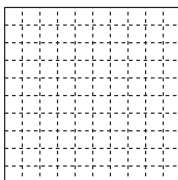
1. Sort the cards into groups so that the representations in each group have the

Launch

- Groups of 2–4
- Give one set of cards from the Instructional master to each group.

same value. Record your sorting decisions. Be prepared to explain your reasoning.

- One of the diagrams has no matching fraction or decimal. What fraction and decimal does it represent?
- Are 0.20 and 0.2 equivalent? Use fractions and a diagram to explain your reasoning.



Student Responses

- Sorted groups:
 - A, F, J, K, and M all show $\frac{4}{10}$.
 - B, D, E, and P all show $1\frac{40}{100}$.
 - C, H, and N all show $\frac{14}{100}$.
 - G, I, and L all show $\frac{4}{100}$.
 - O has no matches.
- $1\frac{4}{100}$ (or equivalent) and 1.04
- Yes. Sample reasoning: 0.2 is $\frac{2}{10}$ and 0.20 is $\frac{20}{100}$. The two fractions are equivalent, so the two decimals are also equivalent. The diagram for 0.2 and 0.20 would both show 20 small squares shaded out of 100.

Activity

- “Work with your group to sort the set of cards by their value.”
- “One diagram has no matching cards. Write the fraction and decimal it represents.”
- 6–7 minutes: group work on the first two problems
- Monitor for the ways students sort the cards and the features of the representations to which they attend.
- “Work on the last problem independently.”
- 2–3 minutes: independent work on the last problem

Synthesis

- Select one group to share each set of sorted cards and explain how they knew the representations belong together.
- “How did you know what fraction and decimal to write for the diagram without any matches?”
- Select a student to share their response to the last problem. Highlight the equivalence of 0.2 and 0.20 as shown in the Student Responses.

Advancing Student Thinking

Students may respond that 0.20 and 0.2 are not “the same.” Consider asking:

- “How would you represent each number on a square grid?”
- “What is the same about the amounts and what is not the same?”

Activity 2

 20 min

True or Not True?

Standards Alignments

Addressing 4.NF.C.6, 4.NF.C.7

In this activity, students apply their understanding of equivalent fractions and decimals more formally, by analyzing equations and correcting the ones that are false. The last question refers to decimals on a number line and sets the stage for the next lesson where the primary representation is the number line.

As students discuss and justify their decisions about the claim in the last question, they critically analyze student reasoning (MP3).

This activity uses *MLR1 Stronger and Clearer Each Time*. Advances: reading, writing

Instructional Routines

MLR1 Stronger and Clearer Each Time

Student-facing Task Statement

- Decide whether each statement is true or false. For each statement that is false, replace one of the numbers to make it true. (The numbers on the two sides of the equal sign should not be identical.) Be prepared to share your thinking.

a. $\frac{50}{100} = 0.50$

b. $0.05 = 0.5$

c. $0.3 = \frac{3}{10}$

d. $0.3 = \frac{30}{100}$

e. $0.3 = 0.30$

f. $1.1 = 1.10$

g. $3.06 = 3.60$

Launch

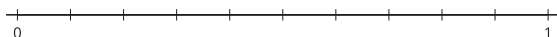
- Groups of 2
- “Earlier, we saw some equations with fractions on both sides of the equal sign. Now let’s look at some equations that include fractions and decimals or just decimals.”

Activity

- “Take a few minutes to complete the activity independently. Then, share your thinking with your partner.”
- 6–7 minutes: independent work time
- “For each equation in the first problem, take turns explaining to your partner how you know whether it is true or false.”

h. $2.70 = 0.27$

2. Jada says that if we locate the numbers 0.05, 0.5, and 0.50 on the number line, we would end up with only two points. Do you agree? Explain or show your reasoning.



Student Responses

1.
 - a. True
 - b. False. Sample replacement: $0.50 = 0.5$
 - c. True
 - d. True
 - e. True
 - f. True
 - g. False. Sample replacement: $3.6 = 3.60$
or $3.06 = 3\frac{6}{100}$
 - h. False. Sample replacement:
 $2.70 = 2\frac{70}{100}$ or $\frac{27}{100} = 0.27$
2. Yes. Sample reasoning: The points 0.5 and 0.50 are equivalent, as they are both halfway between 0 and 1, so they share the same point (the fifth tick mark) on the number line. 0.05 is between 0 and 0.1.

- 3–4 minutes: partner discussion

Synthesis

MLR1 Stronger and Clearer Each Time

- “Share your response to the last question with your partner. Take turns being the speaker and the listener. If you are the speaker, share your ideas and writing so far. If you are the listener, ask questions and give feedback to help your partner improve their work.”
- 3–4 minutes: structured partner discussion.
- Repeat with 1–2 new partners.
- “Revise your initial draft based on the feedback you got from your partners.”
- 2–3 minutes: independent work time

Advancing Student Thinking

Students may be unsure about how to locate 0.05 on a number line. Ask them how they would express the number in words and in fraction notation (in tenths or hundredths). Consider asking them to also name each tick mark on the number line. “If the space between two tick marks represents 10 hundredths, where might 5 hundredths land on the line?”

Lesson Synthesis

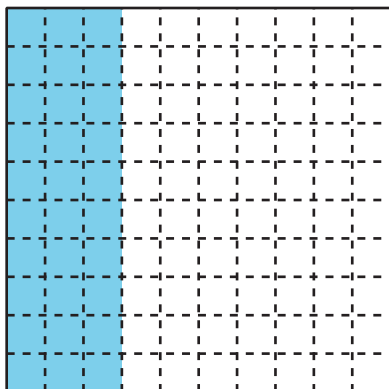
🕒 10 min

“Today we looked at different ways to represent decimals that are equivalent. We used square grids, number lines, and fractions to show that two decimals can represent the same value.”

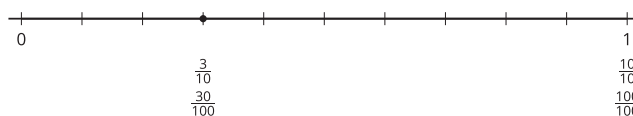
“Suppose a classmate is absent today. How would you convince them that 0.3 and 0.30 are equivalent? Write down at least two different ways.”

Select students to share their thinking. Display the representations they used, or display the following:

“0.3 is 3 tenths and 0.30 is 30 hundredths. The same shaded part represents 3 tenths and 30 hundredths.”



“Both 3 tenths and 30 hundredths share the same point on the number line.”



“0.3 is $\frac{3}{10}$ and 0.30 is $\frac{30}{100}$. The two fractions are equivalent.”

$$\frac{3 \times 10}{10 \times 10} = \frac{30}{100}$$

$$\frac{3}{10} = \frac{30}{100}$$

Suggested Centers

- Rolling for Fractions (3–5), Stage 1: Equivalent Fractions (Supporting)
- Get Your Numbers in Order (1–5), Stage 4: Denominators 2, 3, 4, 5, 6, 8, 10, 12, or 100 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students may say that options B ($5.40 = 5.04$) and D ($0.07 = 0.70$) in the first problem are both true because, in each case, the numbers on the two sides of the equal sign have the same set of digits, just in different places. (Option B has a 5, a 4, and a 0, and option D has two 0s and a 7.)

Next Day Support

- Launch the lesson by asking students to recap the important points of the previous lessons.

Lesson 3: Decimals on Number Lines

Standards Alignments

Addressing 4.NF.C, 4.NF.C.7

Teacher-facing Learning Goals

- Reason about and compare the size of decimals to hundredths using a number line.

Student-facing Learning Goals

- Let's compare some decimals.

Lesson Purpose

The purpose of this lesson is for students to reason about and compare the size of decimals using a number line.

Prior to this lesson, students made sense of tenths and hundredths in decimal notation. They also analyzed and wrote equivalent decimals. In this lesson, they use number lines to reason about the relative size of two or more decimals. The reasoning here is similar to that in an earlier unit, when students used number lines to compare fractions. Students see that, just as before, they can learn about the relative size of decimals by considering their positions on a number line and their relationship to benchmarks such as 0, 0.5, and 1. They will use these insights to compare and order fractions in the next lesson.

Students attend to precision and use the structure of the number line (MP6, MP7) when they locate and label decimals between two tick marks representing tenths. For example, halfway between 0.4 and 0.5 will be the decimal 0.45 whereas 0.48 will be much closer to 0.5 than to 0.4.

Access for:

Students with Disabilities

- Action and Expression (Activity 1)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Which One Doesn't Belong? (Warm-up)

Lesson Timeline

Warm-up

10 min

Teacher Reflection Question

In earlier units, students compared fractions using many different strategies, including

Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

comparing fractions to benchmarks and creating equivalent fractions. Where did you see evidence of students making connections to those reasoning strategies in this lesson?

Cool-down (to be completed at the end of the lesson)

🕒 5 min

More to Compare

Standards Alignments

Addressing 4.NF.C.7

Student-facing Task Statement

1. Use $<$, $>$, or $=$ to make each comparison statement true. Use a number line if it is helpful.

- a. 1.1 _____ 1.10
- b. 0.9 _____ 0.19
- c. 0.03 _____ 0.32
- d. 5.91 _____ 5.01
- e. 4.60 _____ 4.6
- f. 3.73 _____ 3.83



Student Responses

- 1.
 - a. =
 - b. >
 - c. <
 - d. >
 - e. =
 - f. <

 Begin Lesson

Warm-up

 10 min

Which One Doesn't Belong: Decimals and Fractions

Standards Alignments

Addressing 4.NF.C

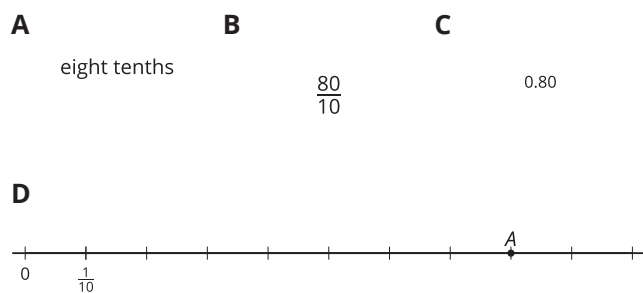
This warm-up prompts students to carefully analyze and compare different representations of numbers. In making comparisons, they solidify their understanding of the connections across representations.

Instructional Routines

Which One Doesn't Belong?

Student-facing Task Statement

Which one doesn't belong?



Student Responses

- A is the only one that doesn't use any numerals (or the only one expressed in words).
- B is the only one that is not equivalent to $\frac{8}{10}$ and that is not less than 1.
- C is the only one that is not expressed in tenths.
- D is the only one that doesn't show the digit 8 and the value is not shown in word or number form.

Launch

- Groups of 2
- Display the image.
- "Pick one that doesn't belong. Be ready to share why it doesn't belong."
- 1 minute: quiet think time

Activity

- "Discuss your thinking with your partner."
- 2–3 minutes: partner discussion
- Share and record responses.

Synthesis

- "How might we revise one or more of the options so that they all represent the same value?" (Sample responses:
 - Change the $\frac{80}{10}$ to $\frac{8}{10}$ or $\frac{80}{100}$.
 - Change option A to say "eight," option C to say "8" or "8.0," and the label for the first tick mark in option D to say "1.")

Activity 1

🕒 20 min

Points on Number Lines

👤 ↔ 👤 PLC Activity

Standards Alignments

Addressing 4.NF.C.7

In this activity, students reason about the relative size of decimals by locating them on a number line. As in a previous activity, they rely on their experience of locating fractions on a number line and the relationship of the decimal values relative to 0 and 1.

If desired and logistically feasible, consider carrying out the activity on a giant number line rather than on paper.

- Stretch a long strip of tape across a wall, at least 8 or 10 feet long. Partition the tape into 12 equal intervals, using shorter pieces of tape as tick marks. Label the locations of 0 and 1.
- Give each group of students 2–3 dot stickers, 4–5 sticky notes, and a thick marker.
- Ask each group to write (on sticky notes) labels for two of the tick marks, with one sticky note for each label.
- Assign each group one or two of the eight decimals in the second problem. Ask them to locate their assigned decimals on the number line, using dot stickers to mark the location and sticky notes to label them.

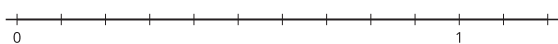
♿ Access for Students with Disabilities

Action and Expression: Internalize Executive Functions. Synthesis: Invite students to plan a strategy, including the tools they will use, for the first two steps of the activity. If time allows, invite students to share their plan with a partner before they begin.

Supports accessibility for: Organization, Social-Emotional Functioning

Student-facing Task Statement

1. Label each tick mark on the number line with the number it represents.



2. Here are eight numbers.

Launch

- Groups of 3–4

Activity

- If creating a giant number line, lead the activity as outlined in the Activity Narrative. Otherwise, ask students to work with their

0.10 0.40 0.80

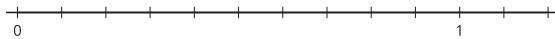
1.10 0.15 0.45

0.75 1.05

- Locate and label each number on the number line.
 - Which number is greatest? Which is least? Explain how the number line can help determine the greatest and least numbers.
3. Locate and label these numbers on the number line.

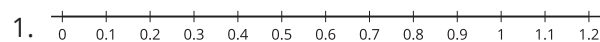
0.24 0.96 0.61

1.12 0.08

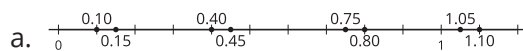


4. Use two numbers from the previous questions to complete each comparison statement so that it is true.
- _____ is greater than _____.
 - _____ is less than _____.
 - _____ is the greatest number.

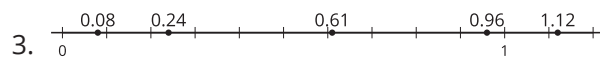
Student Responses



2.



- b. Greatest: 1.10, Least: 0.10. Sample response: The least decimal is closest to 0 or is the leftmost one (0.10). The greatest one is the rightmost one (1.10).



4. Sample response:
- 0.80 is greater than 0.75.

group on the first two problems.

- Pause and discuss:
 - how students knew where to put each decimal
 - how the number line could help us see the least and greatest
- "Take a few quiet minutes to complete the rest of the activity."
- 5–6 minutes: independent work time

Synthesis

- Select students to display their completed number lines (showing the locations of five additional decimals).
- Invite the class to agree or disagree with the locations of the point and discuss any disagreements.
- Select other students to share their comparison statements and how they know each statement is true.

- b. 0.61 is less than 0.96.
c. 1.12 is the greatest number.

Advancing Student Thinking

Students may be unsure whether to label the tick marks between 0 and 1 in terms of tenths or hundredths, or whether to use fraction or decimal notation. Consider asking: “What labels might be helpful for locating the decimals in the activity?”

Activity 2

🕒 15 min

Decimals Compared

Standards Alignments

Addressing 4.NF.C.7

In this activity, students continue to compare decimals to hundredths. They begin by reasoning with a number line and work toward generalizing their observations. Some students may compare two numbers by analyzing the value of the digits in the same place (for example, the tenths in one number and the tenths in the other), but comparing decimals by place value is a standard for grade 5 and thus not expected at this point.

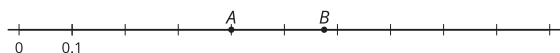
🌐 Access for English Learners

MLR8 Discussion Supports. Display sentence frames to support partner discussion: “I noticed _____ so I . . .” and “I agree/disagree because . . .”

Advances: Conversing, Representing

Student-facing Task Statement

1. Here is a number line with two points on it.



- a. Name the decimal located at point A.
b. Is the decimal at point A less than or

Launch

- Groups of 2

Activity

- “Take a few quiet minutes to work on the activity. Then, share your thinking with your

- greater than 0.50? Explain or show your reasoning.
- c. Is the decimal at point B greater or less than 0.06? Explain your reasoning.
- d. Estimate the decimal at point B.
2. Compare the numbers using $<$, $>$, or $=$. Can you think of a way to make comparisons without using a number line? Be prepared to explain your reasoning.
- a. 0.51 _____ 0.09
- b. 0.19 _____ 0.91
- c. 0.45 _____ 0.54
- d. 0.62 _____ 0.26
- e. 1.02 _____ 0.95
- f. 0.3 _____ 0.30
- g. 4.01 _____ 4.10

Student Responses

1. Sample response:
- a. 0.4 or 0.40
- b. Less than 0.50, because it is to the left of 0.5 or 0.50 on the number line (or because 4 tenths is 40 hundredths, which is less than 50 hundredths).
- c. The decimal at point B is greater than 0.06, because 0.06 or 6 hundredths is to its far left on the number line, close to 0.
- d. 0.57 or 0.58
- 2.
- a. $>$
- b. $<$
- c. $<$
- d. $>$
- e. $>$
- f. $=$
- g. $<$

partner.”

- 7–8 minutes: independent work time
- 3–4 minutes: partner discussion
- For the comparisons in the second problem, monitor for students who:
 - name the decimal in words and compare the number of hundredths (for instance, 62 hundredths and 26 hundredths)
 - relate the decimals to benchmarks such as 0, 0.5, and 1

Synthesis

- See lesson synthesis.

Lesson Synthesis

🕒 10 min

“Today we compared decimals in tenths and hundredths.”

“How can we use a number line to help us make comparisons?” (We can plot the decimals on the number line. The one farther to the right is the greater decimal.)

“How might we compare decimals without using a number line? What strategies did you use when completing the comparison statements in the last activity?”

If not mentioned in students’ explanations, highlight the following reasoning strategies:

- Name the decimals in words and compare the number of hundredths. (For instance, 51 hundredths is more than 9 hundredths.)
- Compare each decimal to benchmarks like 0, 0.5, 1, or other decimals. (For instance, 0.51 is close to 0.50, while 0.09 is close to 0.10 or close to 0.)

Suggested Centers

- Rolling for Fractions (3–5), Stage 1: Equivalent Fractions (Supporting)
- Get Your Numbers in Order (1–5), Stage 4: Denominators 2, 3, 4, 5, 6, 8, 10, 12, or 100 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students may disregard the decimal points in each pair of numbers and compare the numbers as if they were whole numbers.

Next Day Support

- Launch the warm-up or Activity 1 by highlighting important notation from previous lessons.

Lesson 4: Compare and Order Decimals

Standards Alignments

Addressing 4.NF.C.7

Teacher-facing Learning Goals

- Compare and order decimals to hundredths by reasoning about their size.

Student-facing Learning Goals

- Let's put some decimals in order.

Lesson Purpose

The purpose of this lesson is for students to compare and order decimals.

Previously, students reasoned about the relative size of decimals using number lines and other strategies. In this lesson, they apply those strategies to compare and order decimals, both in and out of context. The contexts in this lesson and in the next one share a track-and-field theme and involve measurements (running times in this lesson and jumping distances in the next lesson).

Access for:

Students with Disabilities

- Representation (Activity 2)

Instructional Routines

Estimation Exploration (Warm-up), MLR6 Three Reads (Activity 2)

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

What questions from the lesson provided the most insight into student thinking? What surprised you about the insights you gained?

Cool-down (to be completed at the end of the lesson)

🕒 5 min

From Least to Greatest

Standards Alignments

Addressing 4.NF.C.7

Student-facing Task Statement

Order the numbers from least to greatest.

5.01 0.05 0.5 5.1 0.1 0.51

Student Responses

0.05 0.1 0.5 0.51 5.01 5.1

----- **Begin Lesson** -----**Warm-up**

🕒 10 min

Estimation Exploration

Standards Alignments

Addressing 4.NF.C.7

The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information. In this case, the given decimal pushes students to think in terms of increments of tenths (0.1) and to relate the fractional measurement to nearby whole numbers.

Instructional Routines

Estimation Exploration

Student-facing Task Statement

The person in the image is 1.7 meters tall.

Estimate the wingspan of the eagle in meters.



Record an estimate that is:

too low	about right	too high

Student Responses

Sample responses:

- Too low: 0–1.9
- About right: 2.0–2.5
- Too high: 2.6–3.0

Launch

- Groups of 2
- Display the image.
- “What is an estimate that’s too high?” “Too low?” “About right?”
- 1 minute: quiet think time

Activity

- “Discuss your thinking with your partner.”
- 1 minute: partner discussion
- Record responses.

Synthesis

- “Why might 1.8 meters be too low of an estimate?”
- “Where might a height of 1 meter be on the image of the person? On the image of the eagle?”
- Consider asking:
 - “Is anyone’s estimate less than 2? Is anyone’s estimate greater than 3?”
 - “Based on this discussion does anyone want to revise their estimate?”

Activity 1

🕒 15 min

All in Order

Standards Alignments

Addressing 4.NF.C.7

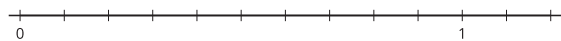
This activity prompts students to apply what they know about tenths and hundredths and decimal notation to arrange two sets of numbers in order, first from least to greatest, and then the other way around.

A number line is given here, but students are likely to start seeing its limits as a tool for comparing and ordering decimals. It takes time to plot each value on the number line, the scale of the number line accommodates only a small range of numbers (numbers like 1.25 and 12.05 would go beyond the line), and there are other ways to discern how two decimals compare—by reasoning about the name of the decimals in tenths and hundredths, and by relating to benchmarks such as whole numbers and 5 tenths (0.5, 1.5, 2.5, and so on).

Student-facing Task Statement

- Order the numbers from least to greatest.
Use the number line if it is helpful.

1.08 0.08 0.80 0.9 0.45 0.54



- Order the numbers from greatest to least.
Use the number line if it is helpful.

1.25 0.95 0.4 0.09 12.05 0.25

Student Responses

- 0.08 0.45 0.54 0.80 0.9 1.08
- 12.05 1.25 0.95 0.4 0.25 0.09

Launch

- Groups of 2
- Display the six decimals in the first problem.
- “How do we name these decimals in terms of tenths and hundredths? Let’s read each one aloud.”
- Display the six decimals in the second problem.
- “Take turns reading each decimal with your partner. Name them in terms of tenths and hundredths.”
- 1 minute: partner work time

Activity

- “Take a few quiet minutes to complete the activity. Then, share your responses with your partner.”
- 5 minutes: independent work time
- 2–3 minutes: partner work time
- Monitor for students who order the decimals by:
 - plotting the decimals on the number line
 - using and comparing the word names of the decimals

- relating each decimal to benchmarks such as 0, 0.5, and 1
- Ask them to share their strategies during the synthesis, in the order as shown.

Synthesis

- Select previously identified students to share their responses and reasoning.
- “After seeing these strategies, which one(s) do you prefer to use for ordering decimals? Why?”

Advancing Student Thinking

Students may arrange the numbers by looking only at the digits in the numbers, without attending to the relative sizes of each decimal. (For example, they may say that 0.45 is greater than 0.9 because 45 is greater than 9.) Consider asking them to name the numbers and think about them in terms of tenths and hundredths, or to express them in fraction notation.

Activity 2

🕒 20 min

400-Meter Dash in a Flash

Standards Alignments

Addressing 4.NF.C.7

In this activity, students compare and order decimals in the context of running times. Unlike in preceding activities, in which most decimals they encountered were less than one or were in the low ones, here the numbers all have two-digit whole numbers, prompting students to be more attentive to the place value of the digits. The context of track and field may be unfamiliar, so time is built into the launch for orienting students and for supporting them in making sense of the problem.

When students look carefully at the meaning of each digit in the numbers and interpret them in terms of the running context they are reasoning abstractly and quantitatively and observing place value structure (MP2, MP7).

This activity uses *MLR6 Three Reads*. Advances: reading, listening, representing

Access for Students with Disabilities

Representation: Access for Perception. Begin by showing a video of an Olympic Women's 400-Meter final event to support both engagement and understanding of the context. To emphasize the relative magnitude of decimals in this context, invite students to attend to the running clock, the moment when the athletes cross the finish line, and the table of final results. Ask, "Why are decimals important here?"

Supports accessibility for: Conceptual Processing, Visual-Spatial Processing

Instructional Routines

MLR6 Three Reads

Student-facing Task Statement

The table shows eight of the top runners in the Women's 400-Meter event. Their best running times, listed here, put the runners in the world's top 25 for this event.

48.37 49.3 48.7 49.26
49.07 49.28 48.83 49.05

The names in the table are arranged by the runners' best time. The fastest runner is at the top.



runner	best time (seconds)	year achieved
Shaunea Miller-Uibo (Bahamas)		2019
Sanya Richards (U.S.A.)		2006
Valerie Brisco-Hooks (U.S.A.)		1984
Chandra Cheesborough (U.S.A.)		1984
Tonique Williams-		2004

Launch

- Groups of 2
- Display a picture of a standard 400-meter running track.
- "How long do you think it would take you to run a lap, about 400 meters? Think about it for a moment, and then share your estimate with your partner."
- 1 minute: partner discussion
- Explain that in track and field, runners compete to run different distances: 100 meters, 200, 400, 800, and more. The United States, Jamaica, and the Bahamas have produced some of the fastest track runners in the world.

MLR6 Three Reads

- Display only the opening paragraph, the eight running times, and the table, without revealing the questions.
- "We are going to read this problem 3 times."
- 1st Read: "The table shows eight of the top runners in the Women's 400-Meter event. Their best running times, listed here, put

runner	best time (seconds)	year achieved
Darling (Bahamas)		
Allyson Felix (U.S.A.)		2015
Pauline Davis (Bahamas)		1996
Lorraine Fenton (Jamaica)		2002

- Put the times in order, from least to greatest, to match the times with the runners.
- How many seconds did it take Sanya Richards to run 400 meters?
- What is Allyson Felix's best time?

Student Responses

- | runner | best time (seconds) | year achieved |
|------------------------------------|---------------------|---------------|
| Shaunea Miller-Uibo (Bahamas) | 48.37 | 2019 |
| Sanya Richards (U.S.A.) | 48.7 | 2006 |
| Valerie Brisco-Hooks (U.S.A.) | 48.83 | 1984 |
| Chandra Cheesborough (U.S.A.) | 49.05 | 1984 |
| Tonique Williams-Darling (Bahamas) | 49.07 | 2004 |
| Allyson Felix (U.S.A.) | 49.26 | 2015 |
| Pauline Davis (Bahamas) | 49.28 | 1996 |
| Lorraine Fenton (Jamaica) | 49.3 | 2002 |

- 48.7 seconds
- 49.26 seconds

the runners in the world's top 25 in this event."

- "What is this story about?"
- 1 minute: partner discussion
- Listen for and clarify any questions about the context.
- 2nd Read: Read the opening paragraph a second time.
- "Name the quantities. What can we count or measure in this situation?" (times in seconds, years)
- 30 seconds: quiet think time
- Share and record all quantities.
- Reveal the questions.
- 3rd Read: Read the entire problem aloud, including the questions.
- "How might we go about matching the times to the right runners?" (Arrange the times in order, from shortest to longest.)

Activity

- "Work with your partner to complete the activity."
- 6–8 minutes: partner work time

Synthesis

- Display the table from the activity.
- Invite students to share their ordered list and discuss how they went about arranging the numbers.
- Highlight explanations that are based on place-value reasoning or on understanding of tenths and hundredths.

Lesson Synthesis

🕒 10 min

"Today we compared decimals and put them in order by their size."

Display these decimals with missing digits:

$$\boxed{0} . \boxed{}$$

$$\boxed{0} . \boxed{1} \boxed{}$$

$$\boxed{1} \boxed{} . \boxed{} \boxed{}$$

$$\boxed{2} . \boxed{}$$

$$\boxed{} . \boxed{2}$$

"Are there numbers that we can compare, even though they are all missing digits?" (Yes, we know 1__ is greater than all the others and 2. __ is greater than 0.__ and 0.1__.)

"Are there numbers that we can't compare?" (0.__, 0.1__, and __.2)

"What makes it possible for us to compare some decimals but not others?" (Sample responses:

- We know that a number with tens is greater than numbers with only ones.
- We can compare numbers that are greater than 1 and those less than 1.
- We can't compare numbers when the digit in the place with the largest value is not known.)

Suggested Centers

- Rolling for Fractions (3–5), Stage 1: Equivalent Fractions (Supporting)
- Get Your Numbers in Order (1–5), Stage 4: Denominators 2, 3, 4, 5, 6, 8, 10, 12, or 100 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students reason that 5.01 is greater than 5.1 because 5.01 has more digits.

Next Day Support

- Before the warm-up, present students with 5.1 and 5.01 and the argument that both represent the same quantity. Pair students up to discuss this argument and offer a statement of agreement or argument against this reasoning.

Lesson 5: Compare and Order Decimals and Fractions

Standards Alignments

Addressing 4.NF.C.5, 4.NF.C.6, 4.NF.C.7

Teacher-facing Learning Goals

- Compare and order fractions and decimals to the hundredths by reasoning about their size.

Student-facing Learning Goals

- Let's put fractions and decimals in order.

Lesson Purpose

The purpose of this lesson is for students to compare and order fractions and decimals to the hundredths.

In a previous unit, students compared and ordered fractions. Earlier in this unit, they did the same with decimals. In this lesson, students compare and order tenths and hundredths in both fraction and decimal notations.

This lesson has a Student Section Summary.

Access for:

Students with Disabilities

- Action and Expression (Activity 1)

English Learners

- MLR8 (Activity 1)

Instructional Routines

Number Talk (Warm-up)

Materials to Copy

- Order Once, Order Twice (groups of 2): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	25 min

Teacher Reflection Question

In upcoming lessons, students will continue thinking about place value, but will work toward much larger whole numbers. What do you know

Activity 2	10 min
Lesson Synthesis	10 min
Cool-down	5 min

about students' current understanding of place value that would be important to keep in mind moving forward?

Cool-down (to be completed at the end of the lesson)

 5 min

Order Up

Standards Alignments

Addressing 4.NF.C.7

Student-facing Task Statement

1. Order the numbers from least to greatest.

3.2 $3\frac{2}{100}$ 2.92 $2\frac{2}{10}$ 3.09

2. Use two numbers from your ordered set and the symbols $<$, $>$, or $=$ to write a true comparison statement.

Student Responses

1. $2\frac{2}{10}$, 2.92, $3\frac{2}{100}$, 3.09, 3.2
2. Sample response: $3.09 > 2.92$ or $2\frac{2}{10} < 3.2$

----- Begin Lesson -----

Warm-up

 10 min

Number Talk: Sums of Fractions

Standards Alignments

Addressing 4.NF.C.5

This Number Talk encourages students to rely on what they know about tenths and hundredths and about equivalent fractions to mentally solve problems. The reasoning elicited here will be helpful later in the lesson when students compare and order fractions and decimals.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $\frac{5}{10} + \frac{50}{100}$
- $\frac{5}{10} + \frac{55}{100}$
- $\frac{6}{10} + \frac{50}{100}$
- $\frac{6}{10} + \frac{65}{100}$

Student Responses

- 1: $\frac{5}{10}$ is equivalent to $\frac{50}{100}$, and $\frac{50}{100} + \frac{50}{100} = 1$
- $\frac{105}{100}$ (or equivalent): $\frac{5}{10}$ is equivalent to $\frac{50}{100}$,
and $\frac{50}{100} + \frac{55}{100} = \frac{105}{100}$
- $\frac{11}{10}$ (or equivalent): $\frac{50}{100}$ is equivalent to $\frac{5}{10}$,
and $\frac{6}{10} + \frac{5}{10} = \frac{11}{10}$
- $\frac{125}{100}$ (or equivalent): $\frac{6}{10}$ is equivalent to $\frac{60}{100}$,
and $\frac{60}{100} + \frac{65}{100} = \frac{125}{100}$

Launch

- Display one expression.
- “Give me a signal when you have an answer and can explain how you got it.”
- 1 minute: quiet think time

Activity

- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

Synthesis

- Consider asking:
 - “Who can restate ____’s reasoning in a different way?”
 - “Did anyone have the same strategy but would explain it differently?”
 - “Did anyone approach the expression in a different way?”
 - “Does anyone want to add on to ____’s strategy?”

Activity 1

🕒 25 min

Order Once, Order Twice

Standards Alignments

Addressing 4.NF.C.6, 4.NF.C.7

In this activity, students encounter both fraction and decimal notation for tenths and hundredths and are asked to arrange them in order by size. To do so, they need to rely on their knowledge of equivalent fractions and of the relationship between these two ways of expressing values. Students look for and make use of structure (MP7), for instance, by identifying the digits that tell us about the ones, tenths, and hundredths in each number.

Set A	$1\frac{6}{10}$	1.06	2.6	$\frac{116}{100}$	0.96
Set B	$\frac{24}{100}$	2.40	2.04	$1\frac{4}{100}$	1.24

Access for English Learners

MLR8 Discussion Supports. Students should take turns placing a card in order and explaining their reasoning to their partner. Display the following sentence frames for all to see: “I noticed _____, so I put . . .” Encourage students to challenge each other when they disagree.

Advances: Conversing, Representing

Access for Students with Disabilities

Action and Expression: Develop Expression and Communication. Synthesis: Identify connections between strategies that result in the same outcomes but use differing approaches.

Supports accessibility for: Memory

Materials to Copy

Order Once, Order Twice (groups of 2)

Required Preparation

- Create a set of cards from the Instructional master for each group of 2–4.

Student-facing Task Statement

Your teacher will give you a set of cards with fractions and decimals.

1. Work with your group to order the numbers from least to greatest. Record your ordered

Launch

- Groups of 2–4
- Give each group one set of cards from the Instructional master.

numbers.

- Find a group whose cards are different than yours. Combine your cards with theirs. Order the combined set from least to greatest. Record your sorted numbers.
- Use the numbers from your sorted set and $<$, $>$, or $=$ symbols to create true comparison statements:

a. _____ $<$ _____

b. _____ $>$ _____

c. _____ $<$ _____

d. _____ $>$ _____

Student Responses

- Set A: 0.96 , 1.06 , $\frac{116}{100}$, $1\frac{6}{10}$, 2.6
Set B: $\frac{24}{100}$, $1\frac{4}{100}$, 1.24 , 2.04 , 2.40
- $\frac{24}{100}$, 0.96 , $1\frac{4}{100}$, 1.06 , $\frac{116}{100}$, 1.24 , $1\frac{6}{10}$, 2.04 , 2.40 , 2.6
- Sample response:
 - $\frac{24}{100} < 1.24$
 - $1.06 > 0.96$
 - $2.40 > 1\frac{4}{100}$
 - $\frac{116}{100} < 2.04$

Activity

- “Work with your group to put the fractions and decimals in order, from least to greatest. Record your ordered set.”
- 4–5 minutes: group work time
- “Next, find a group with a set of cards different than yours. Put all the numbers in order, from least to greatest. Record your ordered set.”
- 8–10 minutes: group work time
- Monitor for the ways students compare fractions and decimals.
- “Complete the last problem independently.”
- 3–4 minutes: independent work time

Synthesis

- Select students to share their ordered collection of 10 cards. Invite the class to agree or disagree with the arrangement.
- “What was the first thing you did or looked at to start ordering? What was the next thing? What came after that?” (We first looked at the digit in the ones place. Next, we decided to write the decimals with the same whole number as fractions and ordered the fractions.)

Advancing Student Thinking

Students may choose to order just the fractions and order all the decimals separately. Consider asking: “How might you order both the fractions and decimals?” and “Which decimals would be helpful to think about as fractions (or the other way around)?”

Activity 2

Long Jumps

 10 min

Standards Alignments

Addressing 4.NF.C.7

In this activity, compare and order decimals and fractions to solve problems about distances. As they do so, they practice reasoning about tenths and hundredths expressed in different notations. Some of the distances are written to the tenths of a meter and others are written to the hundredths, prompting students to attend to the size of the decimals.

When students interpret and order the distances, they reason abstractly and quantitatively (MP2).

Student-facing Task Statement

American athlete Carl Lewis won 10 Olympic medals and 10 World Championships in track and field—in 100-meter dash, 200-meter dash, and long jump.

Here are some of his long-jump records from his career:

year	distance (meters)
1979	8.13
1980	8.35
1982	8.7
1983	8.79
1984	8.24
1987	8.6
1991	8.87



- On this list, which distance is his shortest jump? Which is his best (longest) jump?
- Here are the top distances (in meters) of three other American long jumpers:
 - Bob Beamon: $8\frac{9}{10}$
 - Jarrion Lawson: $8\frac{58}{100}$
 - Mike Powell: $8\frac{95}{100}$

Launch

- Groups of 2
- “How far do you think you could jump if you run really fast to gain speed for the jump? Could you jump from one side of the classroom to the other?”
- “Think about it for a moment, and then share your estimate with your partner.”
- 1 minute: partner discussion
- Familiarize students with the long jump in track and field. Explain that the best long jumpers in the world, including Carl Lewis, can jump more than 8 meters or more than 26 feet.
- Consider showing a video clip of long jumps.

Activity

- “Take a few minutes to work on the task. Then, share your responses with your partner.”
- 6–7 minutes: independent work time
- 3–4 minutes: partner discussion
- Monitor for the ways students compare and order decimals and mixed numbers in the last problem.

Compare their records to Carl Lewis's best jump. Order the distances from greatest to least.

Student Responses

1. The shortest jump is 8.13 meters. The best jump is 8.87 meters.
2. Greatest to least:
 - Mike Powell: $8\frac{95}{100}$
 - Bob Beamon: $8\frac{9}{10}$
 - Carl Lewis: 8.87
 - Jarrion Lawson: $8\frac{58}{100}$

Synthesis

- See lesson synthesis.

Lesson Synthesis

🕒 10 min

"Today we compared tenths and hundredths written as both fractions and decimals."

"How did you compare Carl Lewis's best jump with those of the other jumpers and put the numbers in order?" (First, I wrote Carl Lewis's time as a fraction in hundredths, $8\frac{87}{100}$. The one fraction in tenths can be written as $\frac{90}{100}$. All the numbers have 8 ones, so we ignored it and compared the hundredths.)

If time permits, invite students to share a general process for comparing any set of tenths and hundredths written in fraction and decimal notation.

Suggested Centers

- Rolling for Fractions (3–5), Stage 1: Equivalent Fractions (Supporting)
- Get Your Numbers in Order (1–5), Stage 4: Denominators 2, 3, 4, 5, 6, 8, 10, 12, or 100 (Supporting)

Student Section Summary

In this section, we learned to express tenths and hundredths as **decimals**, locate them on a number line, and compare them.

We learned that $\frac{1}{10}$ written as a decimal is 0.1, and that this number is also read “1 tenth.” $\frac{1}{100}$ written as a decimal is 0.01 and is read “1 hundredth.”

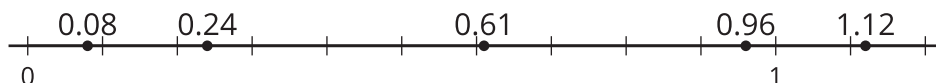
The table shows some more examples of tenths and hundredths in their decimal notation.

- Because $\frac{5}{10}$ and $\frac{50}{100}$ are equivalent, the decimals 0.5 and 0.50 are also equivalent.
- Likewise, $\frac{17}{10}$ and $\frac{170}{100}$ are equivalent, so 1.7 and 1.70 are also equivalent.

fraction	decimal
$\frac{4}{100}$	0.04
$\frac{23}{100}$	0.23
$\frac{5}{10}$	0.5
$\frac{50}{100}$	0.50
$\frac{17}{10}$	1.7
$\frac{170}{100}$	1.70

Just like fractions, decimals can be located on a number line. Doing so can help us compare them.

For instance, 0.24 is equivalent to $\frac{24}{100}$, which is between $\frac{20}{100}$ and $\frac{30}{100}$ (or between $\frac{2}{10}$ and $\frac{3}{10}$) on the number line. We can see that 0.24 is greater than 0.08 and less than 0.61.



----- Complete Cool-Down -----

Response to Student Thinking

Students may compare only the digits in the ones place, disregarding the tenths and hundredths, or be unsure how to compare the tenths and hundredths in different notations (for instance, $3\frac{2}{100}$ and 3.2).

Next Day Support

- Before the warm-up, invite students to work in partners to discuss the similarities and differences between $3\frac{2}{100}$ and 3.2.

Section B: Place-value Relationships through 1,000,000

Lesson 6: How Much is 10,000?

Standards Alignments

Addressing 4.NBT.A.1

Building Towards 4.NBT.A.1

Teacher-facing Learning Goals

- Develop a sense of the relative magnitude of 10,000.
- Recognize ten-thousand as 10 groups of 1,000.

Student-facing Learning Goals

- Let's represent 10,000.

Lesson Purpose

The purpose of this lesson is to develop a relative sense of ten-thousand and understand it as a unit consisting of 10 units of one-thousand.

In this lesson, students build on their understanding of the base-ten structure to develop a sense of the magnitude of 10,000. They first use base-ten blocks and base-ten diagrams to build four-digit and five-digit numbers. They then use a 10-by-10 grid to represent 100 and work together to build a representation of 1,000, and then 10,000. Students may notice the inherent multiplicative structure of the 10-by-10 grids or the array of 10,000 and use counting strategies to identify significant groups of 10 (for example, 10 groups of 100 and 10 groups of 1,000).

Access for:

Students with Disabilities

- Engagement (Activity 1)

English Learners

- MLR8 (Activity 2)

Instructional Routines

What Do You Know About ____? (Warm-up)

Materials to Gather

- Base-ten blocks: Activity 1

Materials to Copy

- Build Numbers (1-5 Digit Cards) (groups of 4): Activity 1
- 10-by-10 Square Grids (groups of 1): Activity 2

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

What did you see or hear students say during the lesson that suggests they have some sense of the relative magnitude of 10,000 in relation to 1,000 and 100?

Cool-down (to be completed at the end of the lesson)

🕒 5 min

Represent Numbers

Standards Alignments

Addressing 4.NBT.A.1

Student-facing Task Statement

1. How many thousands are in 12,000?
2. Draw a diagram to represent 15,400.

Student Responses

1. Twelve thousands
2. A diagram showing 1 unit of ten-thousand, 5 units of a thousand, and 4 units of a hundred

----- Begin Lesson -----

Warm-up

 10 min

What Do You Know about 1,000?

Standards Alignments

Building Towards 4.NBT.A.1

The purpose of this What Do You Know About ____? is to invite students to share what they know and how they can represent the number 1,000. This routine allows teachers to collect information about students' ideas about the relative magnitude of 1,000.

Instructional Routines

What Do You Know About ____?

Student-facing Task Statement

What do you know about 1,000?

Student Responses

- 1,000 is more than 900.
- 1,000 has 10 groups of 100.
- 1,000 has 4 digits.
- 1,000 comes after 999.

Launch

- Display the number.
- “What do you know about 1,000?”
- 1 minute: quiet think time

Activity

- Record responses.
- “How could we represent the number 1,000?”

Synthesis

- “Can you think of a time you have seen 1,000 of something?”

Activity 1

 15 min

Build Numbers

Standards Alignments

Addressing 4.NBT.A.1

The purpose of this activity is to generate, say, and represent multi-digit numbers. Students arrange digit cards to create multi-digit numbers, and use base-ten blocks to represent each number. Teachers should remove cards showing 1 before distributing the set of digit cards, as they will be used later in the activity.

As students build numbers to the ten-thousands place, they may struggle to name the number. As they make sense of the value of the number, they should realize a need for more base-ten blocks, but should be given space to represent the number in a way that makes sense to them. It is not critical to name the number correctly or accurately describe how to build it. The idea is to create a bit of struggle to motivate another way to make sense of the number (MP1). Students see one way to represent 10,000 in the next activity.

Access for Students with Disabilities

Engagement: Develop Effort and Persistence. Check in with groups and provide feedback that encourages collaboration and community. Look for instances of students supporting each other's understanding, as well as students ensuring that each group member is participating in the activity. Consider pausing the activity to share these instances (including specific language and actions) with the whole class.

Supports accessibility for: Attention, Social-Emotional Functioning

Materials to Gather

Base-ten blocks

Materials to Copy

Build Numbers (1-5 Digit Cards) (groups of 4)

Required Preparation

- Create a set of cards from the Instructional master for each group of 4. Remove the cards showing 1. These cards will be redistributed during the activity.
- Each group of 4 needs a small collection of base-ten blocks (for instance: 2 thousands, 5 hundreds, 10 tens, and 20 ones).

Student-facing Task Statement

1. Use two cards to make a two-digit number. Name it and build the number with base-ten blocks.
2. Use a third card to make a three-digit number. Name it and build it with base-ten blocks.
3. Use a fourth card to make a four-digit number. Name it and build it.

Launch

- Groups of 4
- Give each group a small set of base-ten blocks and a set of number cards. Ask them to find all the cards that show 2, 3, 4, or 5 and put the rest of the cards aside.

Activity

- "We are going to create numbers with digit

If you don't have enough blocks, describe what you would need to build the number.

- Your teacher will give you one more digit card. Use the last card from your teacher to make a five-digit number. Make the card the first digit. Name it and build it.

If you don't have enough blocks, describe what blocks you would need to build the number.

Student Responses

Sample responses:

- 25: 2 long rectangles and 5 small cubes
- 325: 3 large squares, 2 long rectangles, and 5 small cubes
- 4,325: 4 large cubes, 3 large squares, 2 long rectangles, and 5 small cubes
- 14,325: 14 large cubes, 3 large squares, 2 long rectangles, and 5 small cubes

cards.”

- “Pay close attention to the directions because you will not use all the cards each time.”
- “Take a minute to read the first two directions and think about any questions you have after reading them.”
- 1 minute: Collect and answer questions.
- 5 minutes: group work time
- Monitor for students who:
 - rearrange digits to make a new number and representation each time
 - add a digit to each number without rearranging digits
- Provide each group with the digit “1” and say “make sure the 1 is the first digit in your number.”
- 5 minutes: group work time

Synthesis

- “How would you build 9,000?” (Use 9 of the large cubes)
- “What number would we make if we add one more 1,000?” (10,000)

Advancing Student Thinking

Students may recognize that it is challenging to represent numbers greater than 1,000 with a small set of base-ten blocks. Consider asking:

- “Do you have enough blocks to represent the number?”
- “If you had enough blocks, which would you use?”
- “What could you draw or write to explain this to a classmate?”

Activity 2

🕒 20 min

What is 10,000?

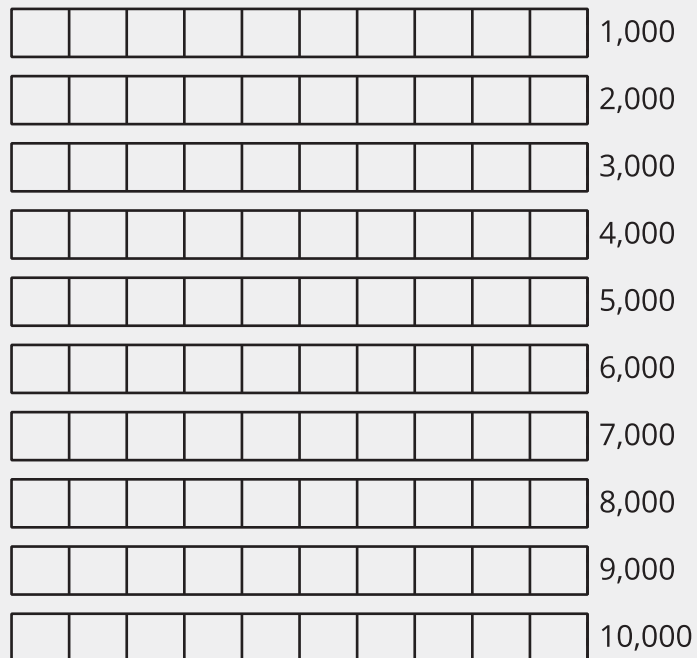
👤 ↔ 👤 PLC Activity

Standards Alignments

Addressing 4.NBT.A.1

The purpose of this activity is to develop a sense of the magnitude of 10,000 and to establish ten-thousand as a unit consisting of 10 units of one-thousand.

In the launch, students learn that the 10-by-10 grid that represented 1 whole in a previous section now represents 100 in this activity. (It is important to establish that in these representations, each small square in the grid represents 1.) Students begin by organizing grids of 100 into groups of 1,000. Some students may intuitively decide to group grids by ten, while others may depend on counting each grid by 100. In the synthesis, students are invited to use their grids to create a class chart to show 10,000 as 10 units of one-thousand.



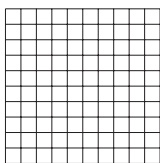
Access for English Learners

MLR8 Discussion Supports. Students should take turns using the 10-by-10 grids to represent a given number and explaining their reasoning to their group. Encourage students to challenge each other when they disagree. Display the following sentence frames for all to see: “I noticed _____, so I used . . .” and “I disagree because . . .”

Advances: Representing, Speaking, Conversing

Student-facing Task Statement

Your teacher will give you a set of 10-by-10 grids.



- Use the grids to represent each of the following numbers. Then, describe or draw a sketch of your representation here.
 - 800
 - 1,000
 - 1,500
 - 2,000
- How many 10-by-10 grids would you need to represent each of the following numbers? Explain or draw a sketch to show your reasoning.
 - 3,000
 - 6,400
 - 9,000
 - 9,900
- Draw a sketch to represent 10,000 using 10-by-10 grids. Be sure to clearly label each group of 1,000 in the sketch.

Materials to Copy

10-by-10 Square Grids (groups of 1)

Launch

- Groups of 4
- Give each student a copy of the black line master.
- Display the 10-by-10 grid
- “What amount is represented by this grid?”
(1, 100, $\frac{100}{100}$)
- “In the previous section a grid like this was used to represent decimals and fractions. In this section this grid will represent hundreds like those found in place value blocks.”
- “We are going to practice building numbers using these grids during the next activity.”
- “Work together to build numbers using 10-by-10 grids.”

Activity

- 10 minutes: group work time
- Monitor for students who organize the grids in groups of 1,000.
- As students work, consider asking,
 - “How are you grouping your grids?”
 - “Why did you decide to group your grids that way?”

Student Responses

1. Student sketches are equivalent to the following:
 - a. Eight 10-by-10 grids
 - b. Ten 10-by-10 grids
 - c. Fifteen 10-by-10 grids
 - d. Twenty 10-by-10 grids
2. Number of 10-by-10 grids:
 - a. 30
 - b. 64
 - c. 90
 - d. 99
3. Sample response: A sketch showing 10 rows of 10 hundreds in each row

Synthesis

- “Let’s organize our grids into groups of 1,000 to make a chart of 10,000. How large do you think the chart is going to be?” (Sample responses: As big as the wall, the length of the whiteboard.)
- Combine groups of 10-by-10 grids to form 10 rows of 1,000 to create a class chart of 10,000.
- Choral count by 1,000 and highlight how the chart reflects the count.
- “Let’s record the groups of 1,000 on the chart as we count.”

Advancing Student Thinking

Students may be unsure how to represent larger numbers in the thousands with the grids. Encourage them to represent numbers in the hundreds and work their way up, by adding more hundreds (one at a time, if helpful).

Lesson Synthesis

🕒 10 min

“Today we worked with large numbers, we used base-ten blocks, grids, and drawings to represent each multi-digit number, and we used groups of hundreds to build 10,000.”

“In first grade, we learned that 10 ones are in each unit of ten. In second grade, we learned that 10 tens are in each unit of one hundred. If we count 10 units of a hundred, we have a thousand, which is a new unit.”

“Where in this class chart do you see ten of something making a new unit?” (Ten of the hundred grids make a row or a unit of one thousand. Ten of the thousand rows make a unit of ten-thousand.)

“If we were going to represent a number like 13,000, how might we do this?” (Add three more rows of 1,000 to the chart.)

“What do you think the next unit will be after ten-thousands?” (Students may guess hundred-thousands or millions.)

“Ten groups of ten-thousand makes a new unit, hundred-thousand. We will learn about this unit in future lessons.”

Suggested Centers

- Greatest of Them All (1–5), Stage 2: Three-digit Numbers (Supporting)
- Mystery Number (1–4), Stage 4: Fractions with Denominators 5, 8, 10, 12, 100 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students represent only parts of the number and leave out thousands or ten-thousands.

The work in this lesson builds from place value concepts developed in a prior unit.

Next Day Support

- Launch Activity 1 by reviewing a correct response to the cool-down.

Prior Unit Support

Grade 2, Unit 5, Section A: The Value of Three Digits

Lesson 7: Numbers Within 100,000

Standards Alignments

Addressing 4.NBT.A.2

Teacher-facing Learning Goals

- Represent, read, and write multi-digit whole numbers to the ten-thousands.

Student-facing Learning Goals

- Let's read, write, and represent multi-digit numbers.

Lesson Purpose

The purpose of this lesson is to read, write, and represent multi-digit numbers up to the ten-thousands.

In this lesson, students count to read and write multi-digit numbers up to the ten-thousands place. They also count to develop a sense of the magnitude of 10,000. In the previous lesson, students counted by thousands and created 10 groups of 1,000 to make 10,000. This continues to build awareness of the structure of our number system with the base of ten (MP7). In this lesson, students practice writing numbers up to 100,000, which sets the stage for 100,000 as a new unit in base-ten in the lessons that follow.

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Choral Count (Warm-up)

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min

Teacher Reflection Question

What did you see or hear that surprised you about students' sense of multi-digit numbers? What question do you wish you had asked today that would have provided great insight into student thinking?

Cool-down

5 min

Cool-down (to be completed at the end of the lesson)

🕒 5 min

Count Ten-thousands

Standards Alignments

Addressing 4.NBT.A.2

Student-facing Task Statement

Consider the number 57,000.

1. How many thousands are in it?
2. How many ten-thousands are in it?
3. Write the number in words.

Student Responses

1. 57
2. 5
3. Fifty-seven thousand

----- **Begin Lesson** -----**Warm-up**

🕒 10 min

Choral Count: By 1,000

Standards Alignments

Addressing 4.NBT.A.2

The purpose of this Choral Count is for students to count on by 1,000 from multiples of one hundred and notice patterns in the count. As students count, they may notice that the digit in the hundreds

place does not change after each new number is said. This is important when considering the magnitude of the number and will support reasoning in the next section as students compare and order numbers. These understandings also help students develop fluency and will be helpful later in this lesson when students read and write numbers within 1,000,000.

Instructional Routines

Choral Count

Student Responses

- 3,400 , 4,400, 5,400, 6,400, 7,400, 8,400, . . . , 22,400, 23,400

Launch

- “Count by 1,000, starting at 3,400.”
- Record as students count.
- Stop counting and recording at 23,400.

Activity

- “What patterns do you see?”
- 1–2 minutes: quiet think time
- Record responses.

Synthesis

- “What parts of the numbers stay the same each time we count?” (The digits in the hundreds, tens, and one place remain the same each time.)
- “When will these digits change?” (The digit in the hundreds, tens, and ones place will never change because we are counting by 1,000 each time.)

Activity 1

 20 min

Count and Write Numbers

Standards Alignments

Addressing 4.NBT.A.2

In this activity, students approach 10,000 by counting up in different ways. Each count ends by reaching 10,000. Students count by different amounts and describe patterns and relationships between numbers. The activity is designed to highlight familiar counting patterns as a way to support naming and writing multi-digit numbers. The final questions in the task ask students to consider the magnitude of each number in relation to 10,000.

When students count by large numbers and examine the counted numbers, they observe patterns in how the different digits in the numbers change (MP7).

Access for Students with Disabilities

Representation: Access for Perception. Provide access to a variety of tools that students may use to approach the task. These might include: a class set of base-ten blocks, colored pencils to color-code place values or highlight the digit that changes, and a visual display reminding students of sketches they can make to represent numbers with thousands and ten-thousands.

Supports accessibility for: Conceptual Processing, Visual-Spatial Processing, Attention

Student-facing Task Statement

Record each count in the given spaces. The first number has been recorded for you.

1. Count by 1,000

5,000 , _____ , _____
 _____ , _____ , _____

2. Count by 100

9,500 , _____ , _____
 _____ , _____ , _____

3. Count by 10

9,950 , _____ , _____
 _____ , _____ , _____

4. Count by 1

9,995 , _____ , _____
 _____ , _____ , _____

5. Complete each statement:

- a. Ten-thousand is 1 more than _____.
- b. Ten-thousand is 1,000 more than _____.

Launch

- Groups of 2
- “Read the directions for problem 1 and share your understanding of the directions with a partner.”
- “What questions do you have before we begin?”

Activity

- 5 minutes: independent work time
- 10 minutes: partner work time
- As students work,
 - listen for how students say the numbers and support them in using place value understanding to say the numbers correctly.
 - look for use of extra digits when writing numbers (for example, students write 90,500 instead of 9,500) and support students with making the revisions by having them say the numbers.

- _____.
- c. Ten-thousand is 10 more than _____.
- d. Ten-thousand is 100 more than _____.

Student Responses

1. 5,000, 6,000, 7,000, 8,000, 9,000, 10,000
2. 9,500, 9,600, 9,700, 9,800, 9,900, 10,000
3. 9,950, 9,960, 9,970, 9,980, 9,990, 10,000
4. 9,995, 9,996, 9,997, 9,998, 9,999, 10,000
5. a. 9,999 b. 9,000 c. 9,990 d. 9,900

Synthesis

- “How is counting by 100 and 1,000 like counting by 1 and 10?” (When counting by thousands, only the thousands change. This is also the case when counting by ones, tens, and hundreds.)
- Have students share their answers for the last problem.
- Consider asking: “Who can restate what _____ shared?”
- If needed, discuss the placement of the comma in each number.

Advancing Student Thinking

If students interpret the part a of the last problem to mean “name a number that is 10,000 more than 1,” consider clarifying by asking: “The number 10 is 1 more than what number?” and “The number 100 is 1 more than what number?” Then, restate the sentence in part a: “Ten-thousand is 1 more than what number?”

Activity 2

🕒 15 min

Many Thousands

Standards Alignments

Addressing 4.NBT.A.2

In this activity, students work within 100,000 and determine how many thousands and ten-thousands are in each number. When students use strategies that are based on place value they are looking for and making use of structure (MP7).

Access for English Learners

MLR8 Discussion Supports. Students should take turns deciding the number of thousands the given number has and explaining their reasoning to their partner. Encourage students to challenge each other when they disagree. Display the following sentence frames for all to see: “I noticed _____, so I . . .” and “I disagree because . . .”

Advances: Representing, Speaking, Conversing

Student-facing Task Statement

- Complete the table to show how many thousands are in each number. In the last row, write your own five-digit number.

number	number of thousands	name in words	
10,000	10	ten thousand	
20,000			
90,000			
11,000			
27,000			
98,000			

- With your partner, name each number in words. (Leave the last column blank for now.)
- In the top (header) row of the last column, write “number of ten-thousands”. Complete the table to show how many ten-thousands are in each number.
- Here are four numbers:

20,500 51,300 82,050 5,970

- Which number has a 5 in the thousands place?
- Which number has a 5 in the ten-thousands place?

Launch

- Groups of 2
- “Read the directions for the first question silently.”
- Call on 2 different students to restate the directions in their own words.

Activity

- 5 minutes: independent work time
- 5 minutes: partner work time

Synthesis

- Read each of the numbers in the table chorally. For additional practice saying numbers, have students read the numbers in the last problem as well.
- Discuss students’ responses to the second and fourth columns.
- “How are the number of thousands related to the number of ten-thousands?” (There are 10 groups of thousands in every ten-thousand.)
- If needed, consider referring to the 10,000 chart created in the last lesson or using base-ten blocks to clarify the relationship between the number of thousands and the number of ten-thousands in each five-digit number.

Student Responses

1. Values in the table:

number	number of thousands	name in words	number of ten-thousands
10,000	10	ten thousand	1
20,000	20	twenty thousand	2
90,000	90	ninety thousand	9
11,000	11	eleven thousand	1
27,000	27	twenty-seven thousand	2
98,000	98	ninety-eight thousand	9
Answers Vary: 63,000	63	sixty-three thousand	6

2. See table.
3. See table.
4.
 - a. 5,970
 - b. 51,300

Advancing Student Thinking

If students identify 27,000 as having only 7 thousands instead of 27 thousands in the first problem, consider asking, “How would we represent 27,000 with only thousands blocks?” and “Does this help you think about the number of thousand blocks we might use to build 20,000?” Students may also need to build or sketch representations to support this reasoning.

Lesson Synthesis

🕒 10 min

“Today we worked with numbers with ten-thousands. We identified thousands and ten-thousands in

numbers.”

Write 68,100 for all students to see. Recite the number chorally to practice reading numbers.

“How can we tell the number of thousands in a number?” (We can count by 1,000 to the number, build or draw the number using thousands, or look at the digits in the thousands place of the number.)

“How do we determine the number of ten-thousands in a number?” (We can count by 10,000 to the number, sketch a diagram to represent the number, or look at the digit in the ten-thousands place.)

Suggested Centers

- Greatest of Them All (1–5), Stage 2: Three-digit Numbers (Supporting)
- Mystery Number (1–4), Stage 4: Fractions with Denominators 5, 8, 10, 12, 100 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students identify the numbers with the digit 2 in places other than the ten-thousands place.

Next Day Support

- Launch the lesson by asking students to recap the important points of the previous lessons.

Lesson 8: Beyond 100,000

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2

Teacher-facing Learning Goals

- Represent, read, and write multi-digit whole numbers within 1,000,000, including in expanded form.

Student-facing Learning Goals

- Let's read, write, and represent numbers beyond 100,000.

Lesson Purpose

The purpose of this lesson is to read, write, and represent numbers within 1,000,000 using base-ten blocks, diagrams, and expanded form.

In previous grades, students used base-ten blocks, diagrams, and expanded form, a specific way of writing a number as a sum of hundreds, tens, and ones, to represent numbers within 1,000. In this lesson, they extend their understanding of place value to write and represent numbers within 1,000,000.

Throughout the lesson, students determine the value represented by given sets of blocks and consider how to use blocks to represent given numbers. The reasoning students use helps to develop conceptual understanding of expanded form, allows them to practice reading and writing large numbers, and prompts them to think about the relative value of each place. In the next lesson, students generalize observations in terms of the relationship between any two adjacent digits in a multi-digit number.

The emphasis in this lesson and subsequent ones is not on how to write a number in expanded form. However, this notation may be helpful for students to notice a relationship between the same digits in adjacent places in large numbers. For example, when students expand 23,450 as $20,000 + 3,000 + 400 + 50$ and 2,345 as $2,000 + 300 + 40 + 5$, they see that the digit 2 in 23,450 has ten times the value of the 2 in 2,345.

When students use strategies that are based on place value and our number system, they are looking for and making use of structure (MP7).

Access for:

Students with Disabilities

- Representation (Activity 1)

Instructional Routines

How Many Do You See? (Warm-up), MLR7 Compare and Connect (Activity 1)

Materials to Gather

- Base-ten blocks: Activity 1, Activity 2, Activity 3

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	10 min
Activity 3	10 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

Reflect on your experience with “How Many Do You See?” in the curriculum. What moves or questions have improved the learning for each of your students during this routine? What improvements would you make next time?

Cool-down (to be completed at the end of the lesson)

 5 min

Represent 234,000

Standards Alignments

Addressing 4.NBT.A.2

Student-facing Task Statement

1. Draw a diagram to represent 234,000.
2. Write 234,000 three different ways.

Student Responses

1. Sample responses: 2 units representing hundred-thousands, 3 units representing ten-thousands, 4 units representing thousands
2. Sample responses:
 - a. $200,000 + 30,000 + 4,000$
 - b. 2 large squares, 3 long rectangles, and 4 small cubes, the small cube is worth 1,000

- c. 23 long rectangles and 4 small cubes, the small cube is worth 1,000

Begin Lesson

Warm-up

🕒 10 min

How Many Do You See?

Standards Alignments

Addressing 4.NBT.A.2

The purpose of this How Many Do You See is to allow students to use place value language to describe the value of the base-ten blocks they see. Students may provide answers that indicate the number of blocks they see, while others may indicate the value of the blocks.

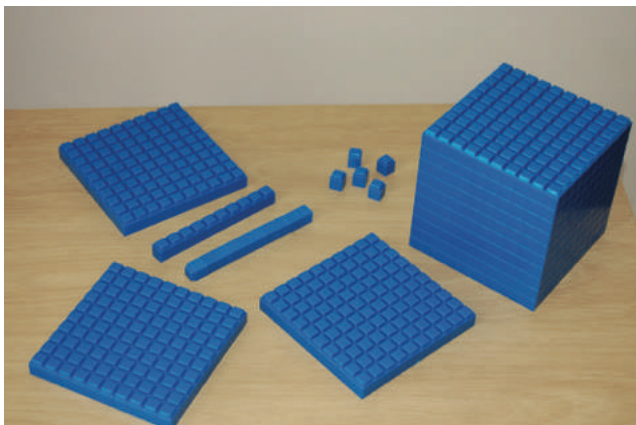
If students do not bring it up, ask about the value of the blocks.

Instructional Routines

How Many Do You See?

Student-facing Task Statement

How many do you see? How do you see them?



Launch

- Groups of 2
- “How many do you see? How do you see them?”
- Display image.
- 1 minute: quiet think time

Activity

- Display image.
- “Discuss your thinking with your partner.”
- 1 minute: partner discussion
- Record responses.

Student Responses

Sample responses:

- 1,325
- 1 thousand, 3 hundreds, 2 tens, 5 ones
- $1,000 + 300 + 20 + 5$
- The large square block has 100 small cubes.
- The long rectangular block has 10 small cubes.
- The large cube has 1,000 small cubes.

Synthesis

- “What amount do the blocks represent?”
- “What relationships do you notice between the blocks?”

Activity 1

🕒 15 min

Lin’s Representation

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2

In this activity, students use base-ten blocks or base-ten diagrams to represent large numbers in the ten-thousands and hundred-thousands. They learn that when they assign a new value, 10, to the small cube, larger numbers are more accessible and can be represented with fewer blocks. The limitation of blocks in the classroom will create a need to represent large numbers in a different way. Blocks should be made available and students should be invited to use them if needed. Students should also be encouraged to represent base-ten blocks in diagrams in ways that make sense to them.

When students interpret and use Lin's strategy, they state the meaning of each base-ten block or part of their diagram in a strategic way allowing them to represent large numbers (MP6).

This activity uses *MLR7 Compare and Connect*. Advances: representing, conversing

Access for Students with Disabilities

Representation: Access for Perception. Provide access to labels for the base-ten blocks. Invite students to act out Lin's strategy by shifting the labels so that the small cube is labeled 10 (ten), the long rectangular block is labeled 100 (hundred), and so on. Extra labels can also support students who need a more concrete representation of the numbers, but who may have run out of base-ten blocks. Invite students to make connections between the blocks, the labels, and the diagrams they draw on paper.

Supports accessibility for: Conceptual Processing, Visual-Spatial Processing, Memory

Instructional Routines

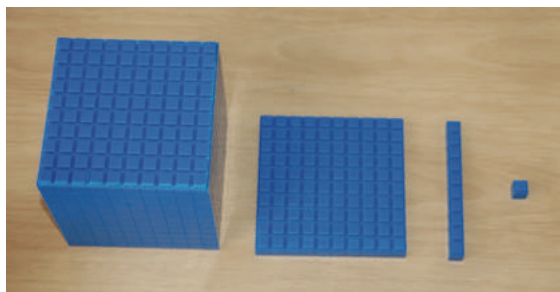
MLR7 Compare and Connect

Materials to Gather

Base-ten blocks

Student-facing Task Statement

1. Use base-ten blocks or draw a base-ten diagram to represent 15,710.
2. Lin is using blocks like these to represent 15,710. She decided to change the value of the small cube to represent 10.



What is the value of each block if the value of the small cube is 10?

- a. Small cube: 10
 - b. Long rectangular block: _____
 - c. Large square block: _____
 - d. Large cube: _____
3. Use Lin's strategy to represent 15,710.

Launch

- Groups of 2
- Give each group a set of base-ten blocks.
- "How would you use base-ten blocks or a base-ten diagram to represent 15,710?"
- 2 minutes: independent work time
- "Although you may not be finished, please share your plan for representing 15,710 with a partner."
- 2 minutes: partner discussion

Activity

- "Lin was working on this same task when she came up with a strategy to build large numbers without using or drawing so many blocks."
- "Silently read about Lin's strategy. Then, explain it to your partner."
- "Work with a partner to complete the rest of the activity."
- "As you complete the second problem,

4. Use Lin's strategy to represent each number.
 - a. 23,000
 - b. 58,100
 - c. 69,470
5. Using her strategy, which base-ten blocks would be used to represent 100,000?

Student Responses

1. Sample response: 15 large cubes, 7 large square blocks, and 1 long block
2.
 - a. 10
 - b. 100
 - c. 1,000
 - d. 10,000
3. 1 large cube, 5 large square blocks, 7 long blocks, and 1 small cube
4. Sample responses:
 - a. 2 large cubes and 3 large square blocks, or 2 units of 10,000 and 3 units of 1,000
 - b. 5 large cubes, 8 large square blocks, and 1 long block, or 5 units of 10,000, 8 units of 1,000, and 1 unit of 100
 - c. 6 large cubes, 9 large square blocks, 4 long blocks, and 7 small cubes, or 6 units of 10,000, 9 units of 1,000, 4 units of 100, and 7 units of 10
5. Sample response: 10 large cubes, or create a new block or figure that represents 100,000.

include details such as notes or labels to help others understand your thinking."

- 5–10 minutes: independent work time
- As students are working, monitor for students who:
 - attempt to draw or represent each unit of the number
 - create a key or communicate groups of each unit (for example, represent 15 thousands using 150 large squares, or draw a new image to represent 1 ten-thousand and use 5 large squares to represent 5 thousands)

Synthesis

MLR7 Compare and Connect

- 2–3 minutes: gallery walk
- "What connections do you see between the representations you made using Lin's strategy?" (I see 15 of the large squares for 15,000 and in another drawing. I see 1 large cube and 5 large squares.)
- Collect student responses and revoice connections between groups of ten that are equivalent to other units.
- "Which blocks would we use to represent 100,000?" (100 large squares or ten large cubes. We could also create a new block to represent 100,000.)

Advancing Student Thinking

Students may try to build 15,710 and run out of blocks to build or represent. Consider asking: "What blocks are missing?" and "What can you draw to represent these missing blocks?"

Activity 2

🕒 10 min

What Number is Represented?

Standards Alignments

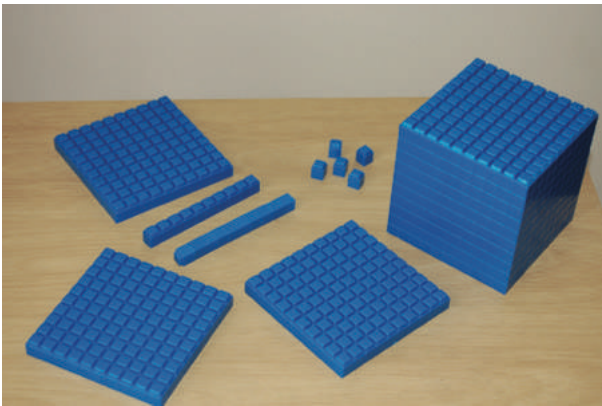
Addressing 4.NBT.A.1, 4.NBT.A.2

In this activity, students interpret a collection of blocks in which a small cube represents different values. They notice a pattern in the value of the digits when the small cube represents 1 and then represents 10. Although students are not required to articulate this relationship until the next lesson, the reasoning here elicits observations about the relationship between the digits in the multi-digit number and the number of each type of block (MP7, MP8).

Materials to Gather

Base-ten blocks

Student-facing Task Statement



1. A small cube represents 1. What value do the blocks in the picture represent?
2. A small cube is now worth 10. What is the new value that the blocks in the picture represent?
3. Write two statements comparing the numbers in the previous problems.

Launch

- Groups of 2
- 3 minutes: independent work time

Activity

- 5 minutes: partner work
- Monitor for students who can describe the relationship between the numbers in the first two problems.

Synthesis

- Invite students to share their answers to the last problem.
- Create a chart of statements students make when comparing the two numbers for reference in a future lesson.

Student Responses

- 1,325, $1,000 + 300 + 20 + 5 = 1,325$
- 13,250,
 $10,000 + 3,000 + 200 + 50 = 13,250$
- Sample responses:
 - The first number is in the thousands, the second is in the ten-thousands.
 - The second number is 10 times the first number.

Advancing Student Thinking

Students may say that the value of the collection of blocks remains the same even when the small cube has changed in value. Consider asking: "If each small cube is now worth 10, what is the value of the long rectangle?"

Activity 3

⌚ 10 min

Build Hundred-thousands

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2

The purpose of this activity is to remind students the meaning of expanded form so they can write numbers to the ten-thousands in expanded form.

Materials to Gather

Base-ten blocks

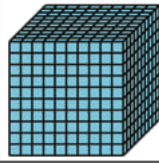
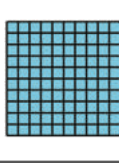


Student-facing Task Statement

- To represent large numbers, Lin changed the value of the small cube to 10. She used the following blocks to represent her first

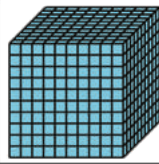
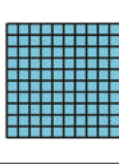


Launch

- Groups of 2

number.

type of block				
number of blocks used	4	9	8	3

- What number did Lin represent? Show or explain your reasoning.
 - Write an equation to represent the value of the blocks.
2. She used more blocks to represent another number.

type of block				
number of blocks used	10	20	4	5

- What number did Lin represent? Show or explain your reasoning.
- Write an equation to represent the value of the blocks.

Student Responses

- 49,830, because 4 ten-thousands blocks is 40,000, 9 thousands is 9,000, 8 hundreds is 800, and 3 tens is 30.
 - $40,000 + 9,000 + 800 + 30 = 49,830$
- 120,450, because 10 ten-thousands blocks is 100,000, 20 thousands is 20,000, 4 hundreds is 400, and 5 tens is 50.
 - $100,000 + 20,000 + 400 + 50 = 120,450$

Activity

- “Complete the first problem on your own and then we’ll talk about it as a class.”
- 3 minutes: independent work time
- Select 1–2 students to share their responses to the first problem.
- “How would we write this number using expanded form?”
($40,000 + 9,000 + 800 + 30$)
- “Remember, when we write a number as a sum of hundreds, tens, and ones, we are using **expanded form**.”

Synthesis

- Select 1–2 students to share equations for the second problem.
- “120,450: Let’s practice saying this number together as a class.”
- “What digit is in the thousands place in this number?” (zero)
- “How did Lin end up with a 0 in the thousands place, when she had 20 blocks with a value of 1,000?” (Each group of 10 thousands makes 1 unit of ten-thousand. Since there are 2 groups of 10 thousands, there are 2 ten-thousands.)
- “How can we explain the number represented by 10 blocks with the value of 10,000 each?” (Ten groups of 10,000 is 100,000. We can also reason by counting by 10,000. Nine blocks with a value of 10,000 is 90,000, so 10 blocks would be 10,000 more than that, or 100,000.)
- Record the reasoning about the value of the blocks using equations:
 $10 \times 10 = 100$
 $10 \times 100 = 1,000$
 $10 \times 1,000 = 10,000$
 $10 \times 10,000 = 100,000$

Advancing Student Thinking

If students lose track of the value of the blocks, consider asking: “What is the value of each long block when the small cube has a value of 10?” and “How might this help you find the value of 10 large cubes?”

Lesson Synthesis

🕒 10 min

Consider using whiteboards during the synthesis to poll the class informally.

“Today we wrote multi-digit numbers using expanded form. Explain expanded form to a partner.”

Write 115,000 for students to see.

“How many hundred-thousands are in this number?” (1)

“How many groups of 10,000 make 100,000?” (10)

“What equation could we write to show 10 groups of 10,000 are equivalent to 100,000?”
($10 \times 10,000 = 100,000$ or $100,000 \div 10 = 10,000$)

“How would we write 115,000 using expanded form?” ($100,000 + 10,000 + 5,000$)

Suggested Centers

- Greatest of Them All (1–5), Stage 2: Three-digit Numbers (Supporting)
- Mystery Number (1–4), Stage 4: Fractions with Denominators 5, 8, 10, 12, 100 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students express 234,000 as something other than $200,000 + 30,000 + 4,000$ in expanded form or in representations.

Next Day Support

- Before the warm-up, pass back the cool down and work in small groups to make corrections.

Lesson 9: Same Digit, Different Value

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2

Teacher-facing Learning Goals

- Describe that the value of a digit in one place represents ten times what it represents in the place to its right.

Student-facing Learning Goals

- Let's describe the relationship between the digits in multi-digit numbers.

Lesson Purpose

The purpose of this lesson is to describe the value of a digit in one place as having ten times the value of the same digit in a place to its right.

This lesson shifts the focus from reading and writing numbers to describing the multiplicative relationship between place values in a multi-digit number. In previous lessons, students used base-ten blocks to represent large numbers, and wrote numbers in expanded form. In this lesson, they use their developing understanding of the value of a digit to begin to articulate that a digit in one place is ten times the value as the same digit in a place to its right.

The syntheses in this lesson help students connect the language of “ten times the value” to equations to help them represent this concept.

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR2 (Activity 2)

Instructional Routines

Card Sort (Activity 1), True or False (Warm-up)

Materials to Copy

- Card Sort: Large Numbers (4 to 6 digits) (groups of 2): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

Cool-down (to be completed at the end of the lesson)

 5 min

The Value of Digits

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2

Student-facing Task Statement

Here are two numbers: 531,690 and 58,487.

1. Write each number in expanded form.
2. Write a multiplication equation to represent the relationship between the digit 5 in both numbers.

Student Responses

1. $500,000 + 30,000 + 1,000 + 600 + 90$, $50,000 + 8,000 + 400 + 80 + 7$
2. $50,000 \times 10 = 500,000$

----- **Begin Lesson** -----

Warm-up

 10 min

True or False: Expanded Expressions

Standards Alignments

Addressing 4.NBT.A.2

The purpose of this True or False is for students to consider the value of the same digit in different places. This reasoning will also be helpful later in this lesson when students describe the relationship between different places in multi-digit numbers.

In this activity, students have an opportunity to look for and make use of structure (MP7) as they use commutative and associative properties of addition to compose numbers and determine equivalent sums.

Instructional Routines

True or False

Student-facing Task Statement

Decide if each statement is true or false. Be prepared to explain your reasoning.

- $4,000 + 600 + 70,000 = 70,460$
- $900,000 + 20,000 + 3,000 = 920,000 + 3,000$
- $80,000 + 800 + 8,000 = 800,000 + 80 + 8$

Student Responses

- False: the 4 in the number represents 400, but the equation shows 4,000.
- True: the $900,000 + 20,000$ is equivalent to 920,000.
- False: each number has the digit 8, but the values of all the 8s are different.

Launch

- Display one statement.
- "Give me a signal when you know whether the statement is true and can explain how you know."
- 1 minute: quiet think time

Activity

- Share and record answers and strategy.
- Repeat with each statement.

Synthesis

Focus question:

- "How can you explain your answer without finding the value of both sides?"
- "We can write numbers in different forms."
- "What form is used to represent the numbers in this True or False?" (expanded form)

Activity 1

 20 min

Card Sort: Large Numbers

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2

In this activity, students sort a set of multi-digit numbers and describe the place-value relationships they notice in the sorted numbers. They analyze numbers that have the same digits and write the numbers in expanded form, highlighting the value of each digit. Students then describe relationships they see between the digits in each number.

For example, students may note that the value of the 2 in 46,200 is 200, in 462,000 it is 2,000, and that 2,000 is ten times as much as 200. In the synthesis, they learn that the observed relationship can be expressed with multiplication and division equations, such as $2,000 = 200 \times 10$, $2,000 \div 200 = 10$, or other equivalent equations.

When students sort the cards, they look for how the numbers are the same and different, including their overall value or the digits that make up the numbers (MP7).

Here are the numbers on the Instructional master, for reference:

186,000	375,000	18,600
37,500	499,000	3,750
49,900	1,860	4,990

Access for Students with Disabilities

Representation: Access for Perception. Synthesis: Use base-ten blocks to demonstrate the relationship between the value of the same digit in different numbers. For example, represent 200 with two large square blocks and 2,000 with two large cubes.

Supports accessibility for: Conceptual Processing, Visual-Spatial Processing

Instructional Routines

Card Sort

Materials to Copy

Card Sort: Large Numbers (4 to 6 digits) (groups of 2)

Required Preparation

- Create a set of cards from the Instructional master for each group of 2 students.

Student-facing Task Statement

Your teacher will give you and your partner a set of cards with multi-digit numbers on them.

1. Sort the cards in a way that makes sense to you. Be prepared to explain your reasoning.
2. Join with another group and explain how you sorted your cards.
3. Write each number in expanded form.
 - a. 4,620
 - b. 46,200
 - c. 462,000
4. Write the value of the 4 in each number.
5. Compare the value of the 4 in two of the numbers. Write two statements to describe what you notice about the values.
6. How is the value of the 2 in 46,200 related to the value of the 2 in 462,000?

Student Responses

1. Sample response:
 - The numbers were sorted based on the digits they have (the same digits go together).
 - The numbers were sorted based on the number of digits they have.
2. No response required.
3.
 - a. $4,000 + 600 + 20$
 - b. $40,000 + 6,000 + 200$
 - c. $400,000 + 60,000 + 2,000$
4. 4,000, 40,000, 400,000
5. The value of the 4 in 4,000 is less than the value of the 4 in 40,000. If we multiply the value of 4,000 by 10, we will get 40,000.

Launch

- Groups of 2
- “Read the directions for the first two problems and explain them to your partner in your own words.”
- Collect explanations and clarify any confusion about directions.

Activity

- Give each group a set of cards from the Instructional master.
- 5 minutes: partner and group work time on the first two problems
- As students work, listen for place-value language such as: value of the digit, ten times, thousands, ten-thousands, and hundred-thousands.
- Record any place-value language students use to describe how they sorted the numbers and display for all to see.
- “Now work independently to write the numbers in the next problem in expanded form. Then, talk with your partner about the value of the digits.”
- 3 minutes: independent work time
- 5 minutes: partner work time
- Monitor for students who:
 - accurately write the numbers in expanded form
 - describe the relationship between the value of the digits in multiplicative terms (“ten times”)

Synthesis

- Invite students to share their expressions in expanded form and what they noticed

6. The value of the 2 in 2,000 is ten times the value of the 2 in 200.

about the value of the 4.

- “What do you notice about the value of the 6 in each number? The value of the 2?” (The value of the 6 is different in each number. It is first 600, then 6,000, then 60,000.)
- Students may talk about the number of zeros in each number. Shift their focus to the place value of the 6— hundreds, thousands, ten-thousands.
- “How is the value of the 2 in 46,200 related to the value of the 2 in 462,000?” (The value of the 2 in 462,000 is 2,000 and the same digit in 46,200 has a value of 200. 2,000 is ten times the value 200.)
- “What multiplication equation could we write to represent the relationship between the 2 in 46,200 and 462,000?”
($2,000 = 200 \times 10$)
- “We can also write this equation using division: $2,000 \div 200 = 10$.”

Advancing Student Thinking

Students may describe the relationship between digits only in terms of “more” or “less.” Consider asking: “How might we describe the relationship between the digits using multiplication?”

Activity 2

🕒 15 min

Expand Large Numbers

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2

In this activity, students read, write, and analyze multi-digit numbers and use expanded form to describe the relationship between the digits. The numbers in the activity are designed to highlight

common errors in reading and writing large numbers. Students encounter numbers with the digit zero in the ten-thousands place and think about how to represent this in expanded and word forms.

Access for English Learners

MLR2 Collect and Display. Synthesis: Direct attention to words collected and displayed from the previous activity. Invite students to borrow language from the display as needed, and update it throughout the lesson.

Advances: Conversing, Reading

Student-facing Task Statement

- Express each number in standard form, expanded form, and word form.

number	expanded form	word form
784,003		
	$50,000 + 9,000 + 300 + 60 + 1$	
		eight hundred three thousand, ninety-nine
310,060		
		nine hundred thirty-four thousand, nine hundred

- Choose two numbers from the table to make this statement true:

The 3 in _____ is ten times the value of the 3 in _____.

- Explain why you chose those numbers.
- Find two classmates who chose different numbers than you did. Record their numbers. Take turns sharing your completed statements and explaining your reasoning.
 - The 3 in _____ is ten times

Launch

- Groups of 2
- “Read the heading in each column and look in the table for examples of each form of number.”
- 1 minute: quiet think time
- 1 minute: partner discussion
- Share and record responses from students. Clarify any misunderstanding about each number form. Record on chart for future reference if needed.

Activity

- “Work independently on the first three problems. Then find 2 classmates to work on the last problem with.”
- 10 minutes: work time

Synthesis

- See lesson synthesis.

- the value of the 3 in _____.
- The 3 in _____ is ten times the value of the 3 in _____.

Student Responses

1. Completed table:

standard form	expanded form	word form
784,003	$700,000 + 80,000 + 4,000 + 3$	seven hundred eighty-four thousand, three
59,361	$50,000 + 9,000 + 300 + 60 + 1$	fifty-nine thousand, three hundred sixty-one
803,099	$800,000 + 3,000 + 90 + 9$	eight hundred three thousand, ninety-nine
310,060	$300,000 + 10,000 + 60$	three hundred ten thousand, sixty
934,900	$900,000 + 30,000 + 4,000 + 900$	nine hundred thirty-four thousand, nine hundred

2. Sample response: The 3 in 310,060 is ten times the value of the 3 in 934,900.
3. Sample response: 310,060 and 934,900: The 3 in 310,060 represents 300,000 and the 3 in 934,900 represents 30,000.
4. Sample responses:
- 934,900 and 803,099
 - 803,099 and 59,361

Advancing Student Thinking

Students may find a number with a digit that is not ten times the value of the digit in another number. Consider asking students to record the values of the 3 in each number and arrange them side-by-side. For example, the 3s in 784,003, 59,361, 803,099, 934,900, and 310,060 have

values of 3, 300, 3,000, 30,000, and 300,000, respectively. Ask:

- “Which value is ten times another value?”
- “How does this help you determine what numbers can you include in the statement, ‘The 3 in _____ is ten times the value of the 3 in _____.’?”

Lesson Synthesis

🕒 10 min

“Today we described the relationship between the same digit in different places in multi-digit numbers.”

“Share with a neighbor something you learned about the relationship between digits from today’s lesson.” (I learned that a digit in the ten-thousand place is ten times the value of the same digit in the thousands place.)

Record students’ ideas using words and ask, “What equation could we write to show how many groups of 80,000 there are in 800,000?” ($800,000 \div 80,000 = 10$ or $10 \times 80,000 = 800,000$)

Suggested Centers

- Greatest of Them All (1–5), Stage 3: Multi-digit Numbers (Addressing)
- Mystery Number (1–4), Stage 4: Fractions with Denominators 5, 8, 10, 12, 100 (Supporting)

----- Complete Cool-Down -----

Response to Student Thinking

Students identify the value of the 5 in each number as something other than 500,000 or 50,000.

Next Day Support

- Before the warm-up, invite students to work in small groups to discuss a correct response to this cool-down.

Lesson 10: Ten Times As Much

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2, 4.NBT.B.4

Teacher-facing Learning Goals

- Write equations to show that each place in a multi-digit number is ten times the value of the place to its immediate right.

Student-facing Learning Goals

- Let's write equations to show the relationship between the digits in multi-digit numbers.

Lesson Purpose

The purpose of this lesson is to write equations to represent the relationship between the value of digits in multi-digit numbers.

In the previous lesson, students wrote multi-digit numbers in expanded form to highlight the value of each digit. They also described the “ten times” relationship between the value of a digit in one place and the value of the same digit in the place to its right. In this lesson, students use multiplication and division equations to represent this relationship.

Access for:

Students with Disabilities

- Engagement (Activity 2)

Instructional Routines

MLR1 Stronger and Clearer Each Time (Activity 1), Number Talk (Warm-up)

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

How did the student work you selected impact the direction of the discussion? What student work might you pick next time if you teach the lesson again?

Cool-down (to be completed at the end of the lesson)

🕒 5 min

Same Digit, Different Place

Standards Alignments

Addressing 4.NBT.A.1

Student-facing Task Statement

Here are two numbers: 872,000 and 700,208

1.
 - a. What is the value of the 2 in each number?
 - b. Write a multiplication or division equation to show the relationship between these two values.
2.
 - a. What is the value of the 7 in each number?
 - b. Write a multiplication or division equation to show the relationship between these two values.

Student Responses

1.
 - a. In 872,000, the 2 is 2,000 and in 700,208, the 2 is 200.
 - b. $2,000 \div 10 = 200$ or $200 \times 10 = 2,000$
2.
 - a. In 872,000, the 7 is 70,000 and in 700,208, the 7 is 700,000.
 - b. $70,000 \times 10 = 700,000$ or $700,000 \div 10 = 70,000$

----- **Begin Lesson** -----**Warm-up**

🕒 10 min

Number Talk: Related Numbers

Standards Alignments

Addressing 4.NBT.B.4

This Number Talk is designed to develop fluency with addition and subtraction of multi-digit numbers. This warm-up also gives students a chance to reason about numbers beyond 1,000. The understanding

elicited here will be helpful later in the unit and throughout grade 4 when students add and subtract fluently using the standard algorithm.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $650 + 75$
- $5,650 + 75$
- $50,650 + 75$
- $500,650 + 75$

Student Responses

- 725: 75 is also $50 + 25$ and $650 + 50 = 700$ and $700 + 25 = 725$
- 5,725: Five thousands are the only new part of this number and 75 is not going to change the thousands so the answer is 5,725.
- 50,725: Fifty thousand is the only new part of this number and 75 is not going to change the ten-thousands so the answer is 50,725.
- 500,725: Five-hundred thousand is the only new part of this number and 75 is not going to change the hundred-thousands so the answer is 500,725.

Launch

- Display one expression.
- “Give me a signal when you have an answer and can explain how you got it.”
- 1 minute: quiet think time

Activity

- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

Synthesis

- “Which parts of the number change when we add 75?” (Just the hundreds, tens and ones.)
- “How do we know without adding if digits in a number are going to change?” (Because we are not adding more than 10 tens to any of the numbers and there's only 6 hundreds, we know the thousands are not going to change.)

Activity 1

🕒 15 min

Alike but Not the Same

Standards Alignments

Addressing 4.NBT.A.1

In this activity, students make sense of the relationships between the values of the same digit in different numbers, and write multiplication and division equations to represent these relationships.

As they complete and analyze the table, students recognize that the value of the digit in one row is ten times as much as the value of the digit in the row below. Students work to articulate these relationships precisely, using words and equations, and receive feedback from their peers on the equations they are writing. During the synthesis, students discuss why a multiplication or a division equation can be used to represent the same relationship.

When students express place value relationships with multiplication and division they observe structure in the place values (MP7). When they help one another improve their explanations, they critique each other's reasoning (MP3).

This activity uses *MLR1 Stronger and Clearer Each Time*. Advances: reading, writing.

Instructional Routines

MLR1 Stronger and Clearer Each Time

Student-facing Task Statement

1. Complete the table with the value of the 8 in each number.

number	value of the 8
180,000	
108,000	
100,800	
100,080	
100,008	

2. Describe the relationship between the value of the 8 in each number.
3. Write a multiplication or division equation to represent the relationship between the values of the 8 in two different numbers in the table.

Student Responses

1. Completed table:

Launch

- Groups of 2

Activity

MLR1 Stronger and Clearer Each Time

- 5 minutes: independent work
- “Share your response to the second problem with your partner. Take turns being the speaker and the listener. If you are the speaker, share your ideas and writing so far. If you are the listener, ask questions and give feedback to help your partner improve their work.”
- 3–5 minutes: structured partner discussion
- Repeat with 2–3 different partners.
- If needed, display question starters and prompts for feedback.
 - “Can you give an example to help show . . . ?”

number	value of the 8
180,000	80,000
108,000	8,000
100,800	800
100,080	80
100,008	8

- Sample response: The value of the 8 in each number is ten times the value of the number below it.
- Sample response: $800 \times 10 = 8,000$ or $80,000 \div 8,000 = 10$

- “Can you use the word ____ in your explanation?”
- “Revise your initial draft based on the feedback you got from your partners.”
- 2–3 minutes: independent work time
- Monitor for students who write a multiplication and division equation to represent the relationship between the values of the 8 in two different numbers.

Synthesis

- Select 1-2 students to share a multiplication and a division equation.

Activity 2

🕒 20 min

More and More Money

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2

In this activity, students use the context of money to deepen their understanding of the relationship between the value of digits in different places—by counting equal groups of tens, hundreds, thousands, and ten-thousands. Writing the value of each stack of bills reinforces the “ten times” relationship between the place values, which in turns supports students in writing multiplication and division equations (MP7).

If play money is available, consider creating a counting collection and asking students to organize each stack and write equations to represent the stacks of bills. Ultimately, students would evaluate the expressions used by different groups and discuss the reasoning behind each equation.

Access for Students with Disabilities

Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts by providing scaffolding questions. For example, you might help students approach question 2 by saying, “Let’s start by looking at the relationship between the stack of tens and the stack of hundreds. What is the relationship between 90 and 900?” For question 3, you might say, “What is the value of the stack of thousands? What is the value of the stack of ten-thousands? What kind of equation do you want to write to show the relationship between these two values?”

Supports accessibility for: Conceptual Processing, Organization, Attention

Student-facing Task Statement

Diego’s class is counting collections of play money during a math class. There are four types of bills: tens, hundreds, thousands, and ten-thousands.



Diego found 9 of each type of bill. He organized each type into a stack, creating four stacks.

- How much money is in each stack of bills?
 - 9 tens
 - 9 hundreds
 - 9 thousands
 - 9 ten-thousands
- Describe the relationship between the values of each stack of bills.
- How is the value of the stack of thousands related to the value of the stack of ten-thousands? Write an equation for that relationship.
- Clare had 21 bills of each type. How much money is in each stack of bills Clare has?
 - 21 tens
 - 21 hundreds

Launch

- Groups of 2
- “Take a minute to read over the directions to the activity and explain them to a partner.”

Activity

- 5 minutes: independent work
- 10 minutes: partner work
- As students work, monitor for the different ways they describe the relationship between the stack of bills.
 - Each stack has the same number of bills but have different values.
 - The value of some stacks can be multiplied by ten to have the same value as another stack.

Synthesis

- See lesson synthesis.

- c. 21 thousands
d. 21 ten-thousands
5. What is the value of the 2 in each stack of bills?
6. How is the value of the 2 in the stack of thousands related to the value of 2 in the stack of ten-thousands? Write an equation for that relationship.

Student Responses

1. a. 9 tens: \$90
b. 9 hundreds: \$900
c. 9 thousands: \$9,000
d. 9 ten-thousands: \$90,000
2. Beginning with the tens stack, each stack is ten times the value of the stack before.
3. Sample response: $9,000 \times 10 = 90,000$
4. a. 21 tens: \$210
b. 21 hundreds: \$2,100
c. 21 thousands: \$21,000
d. 21 ten-thousands: \$210,000
5. 200, 2,000, 20,000, 200,000
6. Sample responses: $20,000 \div 2,000 = 10$ or $2,000 \times 10 = 20,000$

Advancing Student Thinking

Students may be able to write an equation to represent the relationship between digits in the hundreds and thousands but get stuck when writing equations that represent the relationships between digits in larger place values. Consider asking students to describe the relationship between 1,000 and 10,000 by asking:

- “How many groups of 1,000 are needed to create a group of 10,000?”
- “How might you use this reasoning to think about the relationship between 2,000 and 20,000?”

Lesson Synthesis

🕒 10 min

“Today we wrote multiplication and division equations to represent the relationship between the digits in different places in multi-digit numbers.”

- Display equations:
- A. $2,000 \times 10 = 200$
 - B. $2,000 \times 10 = 20,000$
 - C. $20,000 \div 10 = 2,000$
 - D. $20,000 \times 10 = 200,000$
 - E. $200,000 \div 10 = 200$

“Which of these equations represent the relationship between the digit 2 in the stacks of hundreds, thousands, and ten-thousands?” (B, C, D)

“Can you write a new equation that correctly describes the relationship between the digit 2 in two of the stacks?”

Suggested Centers

- Greatest of Them All (1–5), Stage 3: Multi-digit Numbers (Addressing)
- Mystery Number (1–4), Stage 4: Fractions with Denominators 5, 8, 10, 12, 100 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students correctly identify the value of 2 and 7 in each number but write an addition expression to represent the relationship between the digits in the number.

Next Day Support

- Before the warm up, select a student's cool down from the previous lesson (name anonymous). Ask students to identify what the student did well and what the student needs to do to improve the cool down.

Lesson 11: Large Numbers on a Number Line

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2

Teacher-facing Learning Goals

- Describe the relative magnitude of multi-digit whole numbers within 1,000,000 using a number line and place value understanding.

Student-facing Learning Goals

- Let's locate multi-digit numbers on a number line.

Lesson Purpose

The purpose of this lesson is for students to use place value understanding to locate large numbers on a number line and describe number relationships in which one multi-digit number is ten times as much as another.

In this lesson, students both estimate and precisely locate numbers through the hundred-thousands place on a number line. This lesson is designed to deepen students' understanding of the relative position of multi-digit numbers to multiples of 100, 1,000, 10,000, and 100,000. They learn that when numbers are related by ten times as much, they are located in a position on a number line with the same relationship to surrounding benchmark numbers. Students will use the number line in the next section to round large numbers.

This lesson has a Student Section Summary.

Access for:

Students with Disabilities

- Representation (Activity 2)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Estimation Exploration (Warm-up)

Lesson Timeline

Warm-up

10 min

Teacher Reflection Question

Reflect on times you observed students listening to one another's ideas today in class. What norms would help each student better attend to

Activity 1	20 min	their classmates' ideas in future lessons?
Activity 2	15 min	
Lesson Synthesis	10 min	
Cool-down	5 min	

Cool-down (to be completed at the end of the lesson)

🕒 5 min

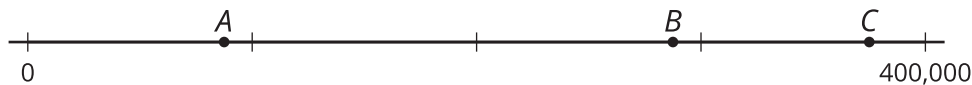
Ten Times on a Number Line

Standards Alignments

Addressing 4.NBT.A.1

Student-facing Task Statement

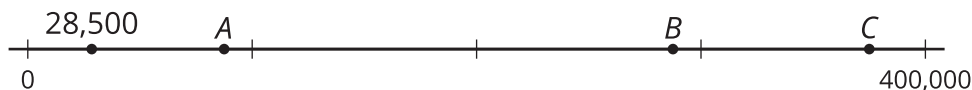
1. Estimate the location of 28,500 on the number line and label it with a point.



2. Which point—A, B, or C—could represent a number that is 10 times as much as 28,500? Explain your reasoning.

Student Responses

1. Response shows a point to the left of A, about a third of the way or halfway between 0 and A.



2. Point B. Sample response: Ten times 28,500 is 285,000, which would be between the tick marks that show 200,000 and 300,000, closer to 300,000. Points A and C are in the 80,000s and 300,000, respectively.

----- Begin Lesson -----

Warm-up

 10 min

Estimation Exploration: What Number Could This Be?

Standards Alignments

Addressing 4.NBT.A.2

The purpose of this Estimation Exploration is to practice the skill of making a reasonable estimate for a number based on its location on a number line. Students give a range of reasonable answers when given incomplete information. They have the opportunity to revise their thinking as additional information is provided. The synthesis should focus on discussing what other benchmarks (multiples of 10) would help make a better estimate. The actual number is revealed in the launch of Activity 1.

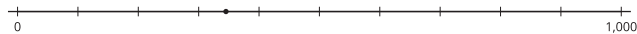
This estimation exploration encourages students to use what they know about place value to determine the value of the two tick marks the point lies between and then reason about where it is located between them (MP7).

Instructional Routines

Estimation Exploration

Student-facing Task Statement

What number is represented by the point?



Record an estimate that is:

too low	about right	too high

Student Responses

- Too low: 0–300
- Too high: 400–1,000
- Just right: 300–400

Launch

- Groups of 2
- Display the image.
- “What number is represented by the point?”
- “What is an estimate that’s too high?” “Too low?” “About right?”
- 1 minute: quiet think time
- 1 minute: partner discussion
- Record responses in the table.

Activity

- “Discuss your thinking with your partner.”
- 1 minute: partner discussion
- Record responses.

Synthesis

- “What information would help you make a more precise estimate?” (Additional tick

- marks or other numbers around the point)
- Consider providing new information. “Would you like to revise your estimates?”
- Record new or revised estimates.
- “How did the additional numbers help you revise your estimate?”
- “What other information would you need to be more confident with your estimate?”

Activity 1

🕒 20 min

Locate Large Numbers

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2

The purpose of this activity is for students to use their understanding of place value and the relative position of numbers within 1,000,000 to partition and place numbers on a number line. Students place four related numbers on a number line and consider relationships between digits to determine how to partition a number line.

The numbers have the same non-zero digits but with different place values, allowing students to observe the closely related values of the tick marks (MP7) and the identical location on the different number lines of the numbers they plot (MP8).

Student-facing Task Statement

1. Locate and label each number on the number line.

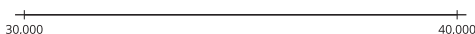
a. 347



b. 3,470



c. 34,700



Launch

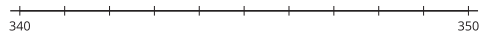
- Groups of 2
- “What do you notice and wonder about the first four number lines?”
- 30 seconds: quiet think time
- 30 seconds: partner discussion
- “Think about where you would place the first number on the number line.”
- “Explain to a partner how you decided where to place the number.”

d. 347,000

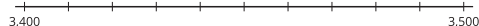


2. Locate and label each number on the number line.

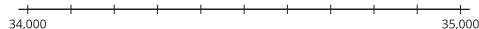
a. 347



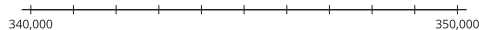
b. 3,470



c. 34,700



d. 347,000



3. What do you notice about the location of these numbers on the number lines? Make two observations and discuss them with your partner.

Student Responses

1. Tick marks on number lines vary. Halfway mark should be marked, and the number will be labeled slightly to the left.
2. Each number is labeled on the seventh tick mark of each number line.
3. Sample responses:
 - In the second problem, the ticks marks are in intervals of 1, 10, 100, and 1,000, respectively.
 - Each number is located in similar places on the number line, although the value of the interval is changing each time by ten.

Activity

- 10 minutes: independent work time
- 3 minutes: partner discussion
- Monitor for students who:
 - add tick marks to show the halfway mark, and the labeled number slightly less than half on each number line in the first problem
 - label the seventh tick mark on each number line for the second problem

Synthesis

- Ask 2–3 students to share their responses and their reasoning for each problem.
- “How did you partition the number line in the first problem?” (I know that 350 is halfway between 300 and 400, so I marked the halfway point, and then estimated where 3 down from that would be.)
- “How do the number lines help you to see the relationship between the numbers?” (The number lines have endpoints that are ten times as much as the number line before. Also, each number is ten times as much as the number before. The place values changed, but the numbers are located in the same relative position.)

Advancing Student Thinking

If students label the number line by ones, consider asking: “How might you use the relationship between 100 and 1,000 to help label the number line?”

Activity 2

🕒 15 min

So Many Numbers, So Little Line

Standards Alignments

Addressing 4.NBT.A.1, 4.NBT.A.2

In this activity, students place a set of numbers that are each ten times as much the one before it on the same number line. In doing so, they notice the impact of multiplying a number by ten on its magnitude. Unlike before, the number lines here have no or fewer intermediate tick marks, prompting students to think about how to partition the lines in order to facilitate plotting their assigned number.

🌐 Access for English Learners

MLR8 Discussion Supports. Synthesis: At the appropriate time, give students 2–3 minutes to make sure that everyone in their group can explain their approach to the problem. Invite groups to rehearse what they will say when they share with the whole class.

Advances: Speaking, Conversing, Representing

♿ Access for Students with Disabilities

Representation: Access for Perception. Begin by demonstrating the relative magnitude of numbers in the hundreds, thousands, ten-thousands, and hundred-thousands using millimeters. Invite students to examine a meter stick and notice the size of one millimeter, ten millimeters, one hundred millimeters, and one thousand millimeters. Invite students to guess the length of ten-thousand and one hundred-thousand millimeters. If time and space allow, prepare a walk outside the classroom with stops at 10,000 millimeters from the door and 100,000 millimeters from the door.

Supports accessibility for: Conceptual Processing, Visual Spatial Processing, Attention

Student-facing Task Statement

Your teacher will assign a number for you to locate on the given number line.

- A. 347
- B. 3,470
- C. 34,700

Launch

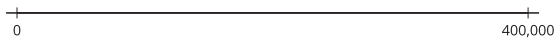
- Groups of 4
- Assign each student in a group a letter A–D.

Activity

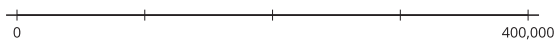
- “Take a few quiet minutes to think about

D. 347,000

1. Decide where your assigned number will fall on this number line. Explain your reasoning.



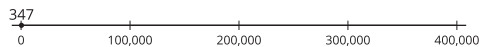
2. Work with your group to label the tick marks and agree on where each of the numbers should be placed.



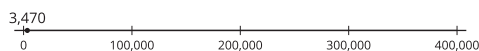
Student Responses

1. Answers vary.
2. Sample responses:

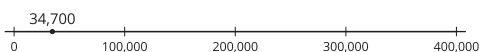
A. 347 would be very close to zero, appearing almost in the same space, because 347 is very small in comparison to 400,000.



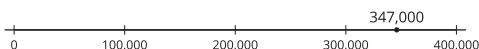
B. 3,470 would be a fraction of an inch from zero if the line is partitioned into 4 sections with 3 tick marks indicating 100,000 each, because 3,470 would be to the far left of the first section (between 0 and 100,000).



C. 34,700 would be within the first section, further to the right than the 3,470 but less than half of this section. If the section is 100,000, halfway would be 50,000.



D. 347,000 would be a little less than halfway between 300,000 and 400,000, or less than halfway in the last section.



where your assigned number should go on the number line.”

- “Then, discuss your thinking with your group and work together to locate all four numbers on the number line.”
- 3–4 minutes: independent work time
- 7–8 minutes: group work time
- Monitor for students who:
 - partition the number line into hundred-thousands or ten-thousands
 - use benchmarks such as 50,000, 200,000, or 350,000

Synthesis

- Ask 2–3 small groups to share their number line.
- Ask questions about structure:
 - “How did you decide to partition the number line?” (I partitioned the number line by tens, hundreds, thousands, ten-thousands, hundred-thousands—not by ones.)
- Ask questions about precision:
 - “Which numbers were easier to locate? Why?” (34,700 and 347,000, were easier to locate because they were further away from zero.)
 - “What would have made it easier to locate the other numbers?” (A longer number line would have made it easier to include more partitions)
- Ask questions about magnitude:
 - “Make some observations about where the numbers are positioned on the number line.” (Most of the numbers we located are much closer to zero than to 400,000)
 - “You located the same four

numbers here as you did in the first activity. How are the locations of the points different from those in Activity 1?" (Sample response: Ten times as much looks different when they are all on the same number line.)

Advancing Student Thinking

If students run out of room and only place some numbers on the number line, consider asking: "What is the halfway mark?" Then, follow up with: "Which numbers would fall before the halfway mark? What about after the halfway mark?"

Lesson Synthesis

🕒 10 min

"Today we located and analyzed sets of large numbers on a number line. In each set, each number was 10 times as much as the number before it. Let's look at the number lines from the first activity."

"How might we use multiplication equations to show the relationship between each point on the number line?"

- $347 \times 10 = 3,470$
- $3,470 \times 10 = 34,700$
- $34,700 \times 10 = 347,000$

"What is the relationship between the values of the labels on each number line?" (Each new number line has tick marks that are valued at 10 times as much as the labels on the previous number line.)

Suggested Centers

- Greatest of Them All (1–5), Stage 3: Multi-digit Numbers (Addressing)
- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Supporting)

Student Section Summary

In this section, we worked with numbers to the hundred-thousands.

First, we used base-ten blocks, 10-by-10 grids, and base-ten diagrams to name, write, and represent multi-digit numbers within 1,000,000. We wrote the numbers in **expanded form** so that we can see the value of each digit. For instance:

$$725,400 = 700,000 + 20,000 + 5,000 + 400$$

Next, we learned that the value of a digit in a multi-digit number is ten times the value of the same digit in the place to its right. For example:

- Both 14,800 and 148,000 have 4 in them.
- The 4 in 14,800 is in the thousands place. Its value is 4,000.
- The 4 in 148,000 is in the ten-thousands place. Its value is 40,000.
- The value of the 4 in 148,000 is ten times the value of the 4 in 14,800.

We used both multiplication and division equations to represent this relationship.

$$10 \times 4,000 = 40,000$$

$$40,000 \div 10 = 4,000$$

Finally, we analyzed the “ten times” relationships by locating numbers on number lines.

Complete Cool-Down

Response to Student Thinking

Students place the number 28,500 between 200,000 and 300,000, or suggested that the number line need to be extended to accommodate 28,500.

Next Day Support

- Launch the first activity in the next day's lesson with a discussion of this cool-down.

Section C: Compare, Order, and Round

Lesson 12: Compare Multi-digit Numbers

Standards Alignments

Addressing 4.NBT.A.2

Teacher-facing Learning Goals

- Compare 2 multi-digit whole numbers within 1,000,000 using place value reasoning.

Student-facing Learning Goals

- Let's compare large numbers.

Lesson Purpose

The purpose of this lesson is for students to compare two multi-digit whole numbers within 1,000,000 by reasoning about place value and to explain how they make comparisons.

Previously, students learned to build, read, name, and write multi-digit whole numbers up to six digits. They also developed an understanding of the relationship between a digit in one place and the same digit in the place immediately to its right. Through that work, students built their intuition for the relative size of numbers.

In this lesson, students use their understanding of place value to compare numbers and articulate how they reason about the size of the numbers. In doing so, they reinforce their understanding of place value and the base-ten number system (MP7). In communicating their thinking, they also practice attending to precision (MP6).

Access for:

Students with Disabilities

- Action and Expression (Activity 2)

English Learners

- MLR2 (Activity 2)

Instructional Routines

Which One Doesn't Belong? (Warm-up)

Materials to Gather

- Materials from a previous activity: Activity 3
- Number cards 0–10: Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	10 min
Activity 3	20 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

Today's work on comparison relies on students' understanding of place value and numbers in base ten. How readily did students connect today's activities to their prior knowledge? What connections could have been made but were missed?

Cool-down (to be completed at the end of the lesson)

🕒 5 min

Two Numbers To Compare

Standards Alignments

Addressing 4.NBT.A.2

Student-facing Task Statement

Here are two numbers, each with the same digit missing in different places.

$\boxed{1}\boxed{7}\boxed{}, \boxed{}\boxed{4}\boxed{2}$

$\boxed{1}\boxed{}, \boxed{7}\boxed{2}\boxed{4}$

1. If the missing digit in both numbers is 1, which number will be greater: the first or the second?
2. Name all the digits from 0 to 9 that will make the second number greater. Explain how you know.

Student Responses

1. The first number. Sample response: The first number will be 17,142 and the second number 11,724. Seventeen thousand is greater than eleven thousand.
2. 8 and 9. Sample response: Using 8 or 9 in the second number makes 18,724 or 19,724, which

is greater than a number in the 17,000s. Using 7 makes 17,724, which is still less than 17,742.

Begin Lesson

Warm-up

🕒 10 min

Which One Doesn't Belong: Friendly Numbers

Standards Alignments

Addressing 4.NBT.A.2

This warm-up prompts students to carefully analyze and compare features of 4 multi-digit numbers. Although students used place value terminology in the previous section, this activity lets the teacher hear the terminologies students use as they describe and compare each number. The observations and reasoning here prepare students to reason about the relative size of numbers later in this lesson.

Instructional Routines

Which One Doesn't Belong?

Student-facing Task Statement

Which one doesn't belong?

- A. 1,395
- B. 3,095
- C. 9,530
- D. 30,195

Student Responses

Sample responses:

- A is the only one without 0 in it.
- B is the only one without a non-zero number in the hundreds place.
- C is the only one that doesn't end with 5 (or

Launch

- Groups of 2
- Display image.
- "Pick one that doesn't belong. Be ready to share why it doesn't belong."
- 1 minute: quiet think time

Activity

- "Discuss your thinking with your partner."
- 2-3 minutes: partner discussion
- Share and record responses.

95). It is the only one that is not an odd number.

- D is the only one that is not a four-digit number. It is the only one without a non-zero number in the thousands place.

Synthesis

- “These numbers have mostly the same digits—0, 1, 3, 5, and 9. Are they all the same size?” (No)
- “Which of these is the greatest? How do you know?” (30,195, because it has five digits and is in the ten-thousands. The others have fewer digits and are in the thousands.)
- “The other numbers are all four-digit numbers. How might we compare them?” (Compare the digits in the thousands place and see which one is greater.)

Activity 1

🕒 15 min

Which is Greater?

Standards Alignments

Addressing 4.NBT.A.2

In this activity, students compare pairs of numbers with the same number of digits and the same set of digits (for example, 278 and 872, or 1,356 and 3,156). The goal is to elicit the idea that both the placement and the size of the digits matter in determining the value of a number, and that the digits in certain places matter more than others for making comparisons (MP7).

Materials to Gather

Number cards 0–10

Student-facing Task Statement

Your teacher will give you a set of cards, each with a single digit, 0–9.



1. Use the cards for 2, 7, and 8 to make two different three-digit numbers. Use $<$ or $>$ to

Launch

- Groups of 3–4
- Give each group a set of cards 0–10. Ask students to remove the cards that show 10.
- “What three-digit numbers can we make with 5, 7, and 3?” (357, 375, 537, 573, 735, 753)

compare them.

2. Now include the digit 1 to make two different four-digit numbers. Compare the numbers.

3. Shuffle the cards. Repeat what you did earlier with new cards.

- a. Four-digit numbers

- b. Five-digit numbers

- c. Six-digit numbers

4. For each pair you compared, how did you decide which number is greater?

Student Responses

- Sample responses: $872 > 728$ or $278 < 782$
- Sample responses: $1,872 < 7,812$ or $1,728 > 1,287$
- Answers vary based on the cards students pick. Sample response:
 - $3,419 > 1,349$
 - $27,031 > 20,317$
 - $85,196 < 91,568$
- Sample response: We compared the first digit of each number first, and then the second digit, and so on. If it's a number in the thousands, we looked at the digit in the thousands place first.

Activity

- “Work with your group to make pairs of numbers using the digits on the cards. First use 3 cards, then 4, then 5, and lastly 6. Compare each pair of numbers.”
- “Think about how you go about comparing each pair of numbers.”
- 5 minutes: group work time
- Monitor for students who:
 - notice that not all digits need to be compared in order to tell which number in a pair is greater
 - use place-value language in describing the numbers
 - make two numbers with the same first digit or the same first and second digits

Synthesis

- Select students to display their number statements and read them. Ask if the class agrees with their comparison.
- “How did you decide which number is greater? Did you compare every digit?”
- Select students who wrote numbers with the same first digit (or the same first two digits) to share their number statements. Ask them to explain how they compared the numbers.
- If no students mentioned that the digits in some places matter more than those in others, ask them about it.
 - “Did you pay attention only to some digits but not others?”
 - “Which ones did you prioritize? Were there any you tended to ignore?”

Advancing Student Thinking

When answering the question about how they compared the numbers, students may say that they “just know” which one was greater. Encourage them to think about the features of the numbers that gave them an immediate clue about the size of the numbers, or the features that they didn’t find as useful.

Activity 2

🕒 10 min

Incomplete Numbers

Standards Alignments

Addressing 4.NBT.A.2

In the previous activity, students noticed that the digits in certain places within numbers matter more than others when comparing numbers. In this activity, students deepen that understanding by comparing pairs of numbers with a missing digit. The missing digit is the same for each pair but may not be in the same place in the two numbers. The reasoning here prompts students to pay closer attention to place value. It also reinforces the idea that the digit with the greatest place value affects the size of the number the most, followed by the digits with the second greatest place value, and so on (MP7).

Access for English Learners

MLR2 Collect and Display. Circulate, listen for and collect the language students use as they compare the pairs of numbers. On a visible display, record words and phrases such as: hundreds place, tens place, place value, bigger, smaller, greater than, less than. Invite students to borrow language from the display as needed, and update it throughout the lesson.

Advances: Conversing, Representing

Access for Students with Disabilities

Action and Expression: Develop Expression and Communication. Give students access to digit cards, base-ten blocks, and a visual display reminding them of place-value language. Invite students to make and explain an educated guess about which number is greater using place-value language, then to use the cards or blocks to test their theory.

Supports accessibility for: Conceptual Processing, Organization

Student-facing Task Statement

1. Here are two numbers. In both, the missing digit is the same number.

$\square 17$ $\square 62$

- Han says the numbers can't be compared because they are incomplete.
- Clare says the second number is greater, no matter what the missing digit is.

Do you agree with either one of them?
Explain your reasoning.

2. Here are some pairs of numbers. The numbers in each pair are missing the same digit. Can you tell which number is greater? Be prepared to explain your reasoning.

a. $\begin{array}{ccc} \square & 9 & \square \\ 3 & \square & 9 \end{array}$

b. $\begin{array}{ccc} \square & \square & 7 & 2 \\ \square & \square & 8 & 5 \end{array}$

c. $\begin{array}{ccc} \square & \square & 1 & 6 \\ 5 & 8 & \square & 2 \end{array}$

d. $\begin{array}{ccc} \square & 7 & \square & 9 & 5 \\ \square & \square & 7 & 4 & 5 \end{array}$

e. $\begin{array}{ccc} \square & 9 & 0 & \square & 5 \\ 9 & \square & 0 & \square & 4 \end{array}$

Student Responses

1. Sample responses:
- Agree with Han. Without the first digit, the numbers can't be compared.
 - Agree with Clare. If the missing digit in both numbers are the same and

Launch

- Groups of 2
- "Let's look at some other pairs of multi-digit numbers, but this time the numbers are missing a digit. Can they still be compared?"

Activity

- "Take a few quiet minutes to think about the first problem. Then, share your thinking with your partner."
- 1 minute: independent work time
- 1–2 minutes: partner discussion
- Pause for a whole-class discussion. Invite students to share their responses, hearing first from those who agree with Han, and then those who agree with Clare.
- "If the missing digit is not the same digit, can we compare the two numbers?" (No "Why not?" (Because we don't know which number has the greater missing digit, so there's no way to compare.)
- If not mentioned by students, point out the features of the pair of numbers being compared: Both are three-digit numbers, both are missing the first digit, and 62 is greater than 17.
- "Let's compare some other numbers that have a missing digit."
- 5 minutes: partner work time
- Monitor for students who use place-value language to explain their thinking.

Synthesis

- Invite selected students to share their explanations.

they are both in the hundreds place, then we can just compare the last two digits or the tens and ones.

2. Sample response:

- a. The first number is greater. Four hundred is greater than 3 hundred.
- b. The second number is greater. Both the thousands and hundreds are the same, so we can look only at the tens to compare the numbers. 85 is greater than 72.
- c. The first number will always be greater. The larger number is in the thousands place. 8 is always more than 5 so the first number will always be larger because it has more thousands.
- d. The second number is greater if the missing digit is 8 or 9, otherwise, the first number is greater.
- e. The first number is greater if the missing digit is 9, otherwise, the second number is greater.

Advancing Student Thinking

When the missing digit in a pair of numbers is in different places (such as 27,__95 and 2__,745), students may generalize about how the numbers compare after trying one possibility for the missing digit, not realizing that a different possibility may change the relative size. Ask them to check their conclusion with other numbers for the missing digits.

Activity 3 (optional)

🕒 20 min

Is It Possible?

Standards Alignments

Addressing 4.NBT.A.2

This optional activity gives students additional opportunities to compare multi-digit numbers by reasoning about the value of the digits in different places. It also prompts students to generalize the relative size of two numbers based on their understanding of place value. Students practice constructing logical arguments (MP3) as they explain whether it is possible for 4_,300 to be less than 3_,400, or for _4,300 to be less than _3,400.

Materials to Gather

Materials from a previous activity

Required Preparation

- Each group of 2 needs a set of cards from the previous activity.

Student-facing Task Statement

- Each of the following pairs of numbers is missing the same digit but in different places.

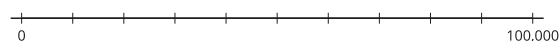
Your teacher will assign a digit to you. Use it as the missing digit and decide if each comparison statement is true.

- $\square, 999 > \square, 500$
- $15, 2\square 0 > 15, \square 02$
- $4\square, 700 < 7\square, 400$
- $1\square 5, 000 > 5\square 1, 000$

- Here are two numbers, each with the same missing digit.

$$4\square, 300 \quad 3\square, 400$$

Choose a digit to complete the numbers and show where they would be on the number line.



- Is it possible to fill in the two blanks with the same digit to make each statement true? If you think so, give at least one example of what the digits could be. If not, explain why

Launch

- Groups of 2
- Give each group a card with a digit between 0 and 9 for each group

Activity

- “Use the digit on the card to complete the comparison statements in the first problem and decide if they are true.”
- 4–5 minutes: group work time
- Pause to collect responses from all the groups.
- “Is the first comparison statement true for all digits?” (Yes, because if the digits are the same, we can just compare 999 to 500.)
- Repeat the question with all statements. Record responses in a chart such as shown:

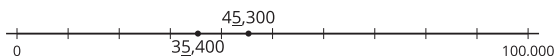
statement	true	false
$_, 999 > _, 500$	all digits	
$15, 2_0 > 15, _02$	0, 1, 2	3, 4, 5, 6, 7, 8, 9
$4_, 700 < 7_, 400$	all digits	
$1_, 5, 000 > 5_, 1, 000$		all digits

it is not possible.

- a. $\begin{array}{|c|} \hline 4 \\ \hline \end{array} \begin{array}{|c|} \hline \\ \hline \end{array}, \begin{array}{|c|} \hline 3 \\ \hline \end{array} \begin{array}{|c|} \hline 0 \\ \hline \end{array} \begin{array}{|c|} \hline 0 \\ \hline \end{array}$ is less than $\begin{array}{|c|} \hline 3 \\ \hline \end{array} \begin{array}{|c|} \hline \\ \hline \end{array}, \begin{array}{|c|} \hline 4 \\ \hline \end{array} \begin{array}{|c|} \hline 0 \\ \hline \end{array} \begin{array}{|c|} \hline 0 \\ \hline \end{array}$.
- b. $\begin{array}{|c|} \hline \\ \hline \end{array} \begin{array}{|c|} \hline 4 \\ \hline \end{array}, \begin{array}{|c|} \hline 3 \\ \hline \end{array} \begin{array}{|c|} \hline 0 \\ \hline \end{array} \begin{array}{|c|} \hline 0 \\ \hline \end{array}$ is less than $\begin{array}{|c|} \hline \\ \hline \end{array} \begin{array}{|c|} \hline 3 \\ \hline \end{array}, \begin{array}{|c|} \hline 4 \\ \hline \end{array} \begin{array}{|c|} \hline 0 \\ \hline \end{array} \begin{array}{|c|} \hline 0 \\ \hline \end{array}$.

Student Responses

- Answers vary depending on the assigned digit. Sample response for the digit 3:
 - $3,999 > 3,500$: True
 - $15,230 < 15,302$: True
 - $43,700 < 73,400$: True
 - $135,000 > 531,000$: False
- Sample response if 5 is chosen as the missing digit:



- No, because 40 thousand will always be greater than 30 thousand.
 - No. If the first digit in the ten-thousands place is the same, then we compare the digits in the thousands place, and 4 thousand is always greater than 3 thousand.

- “Why are the statements in parts a and c true no matter what digit is used?” (Sample response:
 - In part a, both numbers are missing the first digit, in the thousands place. Since the missing digit is the same, we’re comparing the hundreds, and 999 is always greater than 500.
 - In part c, the missing digit is in the thousands place of both numbers, but the digits in the ten-thousands place need to be compared first, and 4 ten-thousand is always less than 7 ten-thousand.)
- “Why is the statement in part d false no matter what digit is used?” (Ten-thousand is never greater than 50 thousand.)
- “Take a few quiet minutes to work on the last two problems independently.”
- 5 minutes: independent work time

Synthesis

- Select students to share their responses to the last two problems.
- Highlight explanations that make it clear that:
 - $4_ ,300$ will always be greater than $3_ ,400$ because 4 ten-thousand is always greater than 3 ten-thousands.
 - $_4,300$ will always be greater than $_3,400$ because, given the first digit is the same, the digits to compare are the thousands, and 4 thousands is always greater than 3 thousands.

Lesson Synthesis

🕒 10 min

“Today we compared many large numbers. At first, all the digits of the numbers being compared were known. Later in the lesson, one digit of each number was missing, but in many cases we were still able to compare the size of the numbers.”

“Suppose a classmate says that we can’t compare 380, _51 and 384, _89 because a digit is missing from each. How might you convince them that it can be done? Write down what you might say to that classmate.”

Invite students to share their explanations. Highlight those that make it clear that both numbers have 3 hundred-thousands and 8 ten-thousands, but one has 0 thousand and the other has 4 thousands. This tells us that the second number is greater, regardless of what digit is missing in the places to the right of the thousands place.

Suggested Centers

- Greatest of Them All (1–5), Stage 3: Multi-digit Numbers (Addressing)
- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Supporting)

Complete Cool-Down

Response to Student Thinking

Students compare the two numbers with different digits in the two blanks. Or, they compare the numbers with the same digit in the blanks but don't compare all the possible digits or don't attend to place value when making comparisons.

Next Day Support

- Add this cool-down to the first activity. Ask students to discuss how they could figure out which digits would make the second number greater without trying each digit in both numbers.

Lesson 13: Order Multi-digit Numbers

Standards Alignments

Addressing 4.NBT.A.2

Teacher-facing Learning Goals

- Compare and order multi-digit whole numbers within 1,000,000.

Student-facing Learning Goals

- Let's put some multi-digit numbers in order.

Lesson Purpose

The purpose of this lesson is for students to compare and order multi-digit whole numbers within 1,000,000.

Previously, students reasoned about place value to compare pairs of multi-digit numbers. In this lesson, they continue to do so as they apply their reasoning to put whole numbers in order of size.

Access for:

Students with Disabilities

- Engagement (Activity 2)

Instructional Routines

MLR1 Stronger and Clearer Each Time (Activity 1), True or False (Warm-up)

Lesson Timeline

Warm-up	10 min
Activity 1	25 min
Activity 2	10 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

In today's lesson, students constructed clear explanations using mathematical language. How well did the prompts and structures support those ends? If you were to teach this lesson again, what adjustments might be helpful?

Cool-down (to be completed at the end of the lesson)

🕒 5 min

From Least to Greatest

Standards Alignments

Addressing 4.NBT.A.2

Student-facing Task Statement

Order the following numbers from least to greatest.

94,942 9,042 279,104 9,420 59,000 500,492 279,099

Student Responses

9,042 9,420 59,000 94,942 279,099 279,104 500,492

----- **Begin Lesson** -----**Warm-up**

🕒 10 min

True or False: Decomposed Numbers

Standards Alignments

Addressing 4.NBT.A.2

The purpose of this True or False is to elicit the insights students have about the composition of multi-digit numbers in terms of place value. It also reinforces the idea that the same digit has different values depending on its place in a number—that is, digits cannot be viewed in isolation of their positions. The reasoning students do here will be helpful later when students compare and order numbers within 1,000,000.

Instructional Routines

True or False

Student-facing Task Statement

Decide if each statement is true or false. Be prepared to explain your reasoning.

- $1,923 = 1 + 90 + 200 + 3,000$
- $1,923 = 1,000 + 90 + 20 + 3$
- $19,203 = 10,000 + 9,000 + 200 + 3$
- $190,023 = 10,000 + 90,000 + 20 + 3$

Student Responses

- False: the sum on the right is 3,291, which is not equal to 1,923.
- False: the numbers on the right add up to 1,113, not 1,923.
- True: the sum on the right, 19,203, is equal to the number on the left. The sum on the right is the expanded form of 19,203.
- False: the sum on the right is 100,023, not 190,023.

Launch

- Display one statement.
- “Give me a signal when you know whether the statement is true and can explain how you know.”
- 1 minute: quiet think time

Activity

- Share and record answers and strategy.
- Repeat with each statement.

Synthesis

- “How would you correct the false statements so that they become true?”
 - $3,291 = 1 + 90 + 200 + 3,000$
 - $190,023 = 100,000 + 90,000 + 20 + 3$

Activity 1

🕒 25 min

Ways to Compare

Standards Alignments

Addressing 4.NBT.A.2

This activity prompts students to examine more closely how multi-digit numbers can be compared, and to use their insights to order several numbers. Students solidify their awareness that looking only at the first digit is not a definitive way of comparing numbers. They also practice constructing a logical argument and critiquing the reasoning of others (MP3) when they explain

why the strategy of analyzing only one digit is not reliable. When students refine Tyler's statement about comparing numbers to include making sure to compare digits with the same place value, they attend to precision in the language they use (MP6).

This activity uses *MLR1 Stronger and Clearer Each Time*. Advances: reading, writing

Instructional Routines

MLR1 Stronger and Clearer Each Time

Student-facing Task Statement

1. Tyler compares large numbers by looking at the first digit from the left.

He says, "The greater the first digit, the greater the number. If the first digit is the same, then we compare the second digit."

In each of these pairs of numbers, is the number with the greater first digit also the greater number?

- a. 985,248 and 320,097
 - b. 72,050 and 64,830
 - c. 320,097 and 58,978
 - d. 54,000 and 587,000
 - e. 58,978 and 547,612
 - f. 146,001 and 1,483
2. Does Tyler's strategy work for comparing any pair of numbers? Explain your reasoning.
 3. How would you compare large numbers? Describe your strategy for comparing 54,000 and 587,000.
 4. Use your strategy to order these numbers from least to greatest.

a. 87,696 847,040 84,381

Launch

- Groups of 2
- Read the first problem as a class.
- Ask 1–2 students to restate Tyler's claim in their own words.

Activity

- "Take a few quiet minutes to work on the first two problems about Tyler's strategy. Then, share your responses with your partner."
- 4–5 minutes: independent work time
- 2–3 minutes: partner discussion
- Monitor for students who use place-value understanding to explain why Tyler's strategy is not reliable.
- "Work on the last two problems independently."
- 4–5 minutes: independent work time

Synthesis

MLR1 Stronger and Clearer Each Time

- "Share your strategy for comparing multi-digit numbers with your partner. Take turns being the speaker and the listener. If you are the speaker, share your ideas and writing so far. If you are the listener, ask questions and give feedback to help your

- b. 63,591 630,951 63,951
631,051

Student Responses

1.
 - a. Yes
 - b. Yes
 - c. No
 - d. No
 - e. No
 - f. No
2. No. Sample response: It works when the same number of digits, but doesn't always work when the two numbers have different numbers of digits.
3. Sample response: I would see how many digits there are. The number with more digits is greater. If they have the same number of digits, I'd compare the digits with the same place value. I know 54,000 is less than 587,000 because the first number is in the ten-thousands and the second in the hundred-thousands.
4.
 - a. 84,381 87,696 847,040
 - b. 63,591 63,951 630,951 631,051

partner improve their explanation.”

- 3–4 minutes: structured partner discussion
- Repeat with 1–2 other partners.
- “Revise your initial description based on the feedback you got from your partners.”
- 2–3 minutes: independent work time
- Invite students to briefly share their ordered sets of numbers from the last problem and their reasoning. Record and display their responses.
- If not mentioned in students' explanations, point out that in the last set of numbers, the third digit (in the thousands place) in each 630,951 and 631,051 is what tells us how the two numbers compare. The third digit (in the hundreds place) also tells us how 63,591 and 63,951 compare.

Advancing Student Thinking

Students may think that a number with larger digits is always greater than one with smaller digits, regardless of their place value and the number of the digits in each number. For instance, they consider 58,978 to be greater than 547,612 because the former has the digits 5, 7, 8, and 9, and the latter has smaller digits: 1, 2, 4, 5, 6, and 7. Urge students to read each number aloud and then ask which is greater: a number in the 58 thousands and one in the 547 thousands. Alternatively, ask students to identify in each 58,978 and 547,612 the digit in the place with the greatest value. Urge them to consider which is greater: 5 ten-thousand or 5 hundred-thousand.

Activity 2

🕒 10 min

Video Game Scores

Standards Alignments

Addressing 4.NBT.A.2

In this activity, students apply their understanding of place value to order multi-digit whole numbers and solve problems in context. They also reason about the range of numbers whose values are between two given numbers.

♿ Access for Students with Disabilities

Engagement: Provide Access by Recruiting Interest. Synthesis: Invite students to generate a list of additional examples of times they would need or want to put large numbers in order.

Supports accessibility for: Memory

Student-facing Task Statement

Mai and her friends had a video game tournament one weekend.



Here are the scores at the end of the tournament:

player	score
Mai	93,005
Priya	101,012
Kiran	90,298
Noah	90,056
Clare	98,032
Elena	89,100
Andre	--

1. Rank the scores from highest to lowest. Who

Launch

- “Who enjoys playing video games? What games do you enjoy playing?”
- “Who has played a game where the scores of the players get accumulated or added up over multiple rounds?”
- “Let’s use what we know about big numbers to compare some video game scores and rank some players.”

Activity

- “Take a few quiet minutes to work on the activity. Then, discuss your responses with your partner.”
- 6–7 minutes: independent work time

Synthesis

- Invite students to share the ranking of the players and their reasoning. Record their

is in first place?

2. Andre's score was accidentally deleted but everyone agreed that he is in second place. Could Andre's score be a six-digit number?

Describe what Andre's score could be and give a couple of examples.

Student Responses

1. Priya is in the first place. The scores:
 - 101,012
 - 98,032
 - 93,005
 - 90,298
 - 90,056
 - 89,100
2. Yes, it could be a six-digit number. Sample response: Andre score could be any number greater than 98,032 and less than 101,012, for example: 99,437 or 100,005.

responses.

- Invite students to share examples of what Andre's score could be.
- If not mentioned in students' explanations, point out that 101,012 (the highest score) is 1,012 greater than the first six-digit number, 100,000. This means there are many six-digit numbers that could be the second-highest score.

Lesson Synthesis

🕒 10 min

"Today we compared and ordered numbers within 1,000,000."

"Is it true that whole numbers with more digits are always greater than those with fewer digits? Why or why not? Can you give an example?" (Yes. More digits means greater place values. A three-digit number has hundreds for its largest place value. A four-digit number has thousands.)

"Write down two large numbers that show that it is possible to tell which number is greater by comparing the first or leftmost digits. Then, share the numbers with your partner." (Sample response: 6,315 and 4,315)

"Write down two other numbers that show that we can't rely on the first or leftmost digits to tell us which number is greater. Share them with your partner." (6,315 and 42,315)

Suggested Centers

- Greatest of Them All (1–5), Stage 3: Multi-digit Numbers (Addressing)
- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Supporting)

Complete Cool-Down

Response to Student Thinking

Students identify 279,099 as being greater than 279,104, either because they misread the digits, or because the former has two 9s in the last three digits and the latter has a 1 and a 4.

Next Day Support

- Before the warm-up, have students work in partners to discuss the digits that help them decide which is larger and the reasoning behind the mistake that 279,099 is larger.

Lesson 14: Multiples of 10,000 and 100,000

Standards Alignments

Addressing 4.NBT.A.2, 4.NBT.A.3
Building Towards 4.NBT.A.3

Teacher-facing Learning Goals

- Identify the closest multiples of 1,000, 10,000, and 100,000 to a given whole number.

Student-facing Learning Goals

- Let's explore multiples of 1,000, 10,000, and 100,000 and how other numbers relate to them.

Lesson Purpose

The purpose of this lesson is for students to reason about the position of numbers relative to their multiples of 1,000, 10,000, and 100,000.

Prior to this point, students have learned to compare and order large numbers. They have also read, written, and decomposed numbers in terms of place value. In this lesson, students look at the relationship between multi-digit numbers and multiples of 1,000, 10,000, and 100,000. Number lines are the central representation of this lesson. They allow students to reason visually before they transition to reasoning numerically when they round numbers in future lessons.

Access for:

Students with Disabilities

- Engagement (Activity 1)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Choral Count (Warm-up)

Materials to Gather

- Stickers: Activity 1
- Sticky notes: Activity 1

Materials to Copy

- On Which Line Do They Belong? (0-700,000 number line) (groups of 30): Activity 1

Lesson Timeline

Warm-up 10 min

Teacher Reflection Question

Who participated in math class today? What

Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

assumptions are you making about those who did not participate? How can you leverage each of your student's ideas to support them in being seen and heard in tomorrow's math class?

Cool-down (to be completed at the end of the lesson)

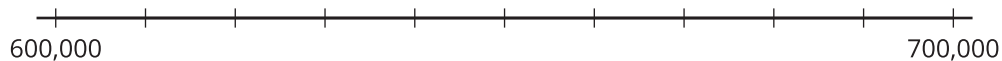
🕒 5 min

Near 627,800

Standards Alignments

Addressing 4.NBT.A.3

Student-facing Task Statement



- Which two multiples of 10,000 are closest to 627,800?
 - Of the two multiples of 10,000, which one is closer to 627,800?
- Which two multiples of 100,000 are closest to 627,800?
 - Of the two multiples of 100,000 which one is closer to 627,800?

Student Responses

- 620,000 and 630,000.
 - 630,000 is the nearest to 627,800.
- 600,000 and 700,000.
 - 600,000 is the nearest to 627,800.

----- Begin Lesson -----

Warm-up

🕒 10 min

Choral Count: Multiples of 1,000, 10,000, and 100,000

Standards Alignments

Addressing	4.NBT.A.2
Building Towards	4.NBT.A.3

The purpose of this Choral Count is to familiarize students with multiples of 1,000, 10,000, and 100,000 and to notice patterns in the count. These understandings help students develop fluency and will be helpful later in this lesson when students locate large numbers on number lines and identify multiples of 10,000 and 100,000 that are near those numbers.

Instructional Routines

Choral Count

Student Responses

- By 1,000s:
 - 85,000, 86,000, . . . , 90,000
 - 91,000, 92,000, . . . , 100,000
 - 101,000, 102,000, . . . , 110,000
 - 111,000, 112,000, . . . , 115,000
- By 10,000s:
 - 80,000, 90,000, 100,000
 - 110,000, 120,000, . . . , 200,000
 - 210,000, 220,000, 230,000
- By 100,000s:
 - 0, 100,000, 200,000, . . . , 400,000

Students may notice:

- Some numbers in one list also appear in the other two lists.
- Multiples of 10,000 up to 110,000 are also multiples of 1,000.
- 100,000 appears in all three lists.

Launch

- “Let’s count by some large numbers. We’ll do three rounds.”
- Prepare to record three rounds of counting: by 1,000, 10,000, and 100,000. Record the count by 10,000 on a number line.
- “Count by 1,000, starting at 85,000.”
- Stop counting and recording at 115,000.
- “Count by 10,000, starting at 80,000.”
- Stop counting and recording at 230,000.
- “Count by 100,000, starting at 0.”
- Stop counting and recording at 400,000.

Activity

- “What patterns do you see?”
- 1–2 minutes: quiet think time
- Record responses.

Synthesis

- “The first set of numbers shows ‘multiples of 1,000.’ The second set shows ‘multiples of 10,000,’ and the third set shows ‘multiples of 100,000.’”
- “How do we know that 85,000 is a multiple of 1,000?” ($85 \times 1,000 = 85,000$)

- “How do we know that 90,000 is a multiple of 10,000?” ($9 \times 10,000 = 90,000$)
- “Can a multiple of 1,000 also be a multiple of 10,000? If you think so, show some examples.” (Yes, for example, 80,000 and 120,000 are multiples of 1,000 and 10,000. They show up on both lists.)
- “Can a multiple of 10,000 also be a multiple of 100,000? Show examples.” (Yes, for example, 100,000 and 200,000)
- “Can a multiple of 100,000 also be a multiple of 1,000? Show examples.” (Yes, for example, 100,000)

Activity 1

🕒 20 min

On Which Line Do They Belong?

Standards Alignments

Building Towards 4.NBT.A.3

In this activity, students locate five- and six-digit numbers on a series of number lines. The endpoints of each number line are multiples of 100,000, and the space between them is partitioned into ten equal intervals. As they locate the numbers, students recognize each tick mark as a multiple of 10,000 (MP7). Later in the activity, students use a number line to name multiples of 10,000 that are near given five-digit numbers.

Prior to the lesson, create number lines from the Instructional master and post them around the room for students to visit during the activity.

🕒 Access for Students with Disabilities

Engagement: Develop Effort and Persistence. Differentiate the degree of difficulty or complexity. Some students may benefit from practicing with more accessible values first. For example, display a 100–200 number line with ten tick marks, and invite students to discuss multiples of 10 and 100 that they see. Help them articulate a strategy to place 182 on the number line. Encourage students to draw connections to this work as you introduce the 100,000–200,000 number line.

Supports accessibility for: Conceptual Processing, Language, Attention

Materials to Gather

Stickers, Sticky notes

Materials to Copy

On Which Line Do They Belong? (0-700,000 number line) (groups of 30)

Required Preparation

- Create number lines from the Instructional master and post them around the room before the activity.

Student-facing Task Statement

Your teacher will assign a set of numbers to you.

A	140,261	100,025	486,840	676,850
B	450,099	414,500	128,201	379,900
C	158,002	42,326	99,982	428,950
D	194,030	658,340	541,700	621,035
E	215,300	499,600	608,720	644,700

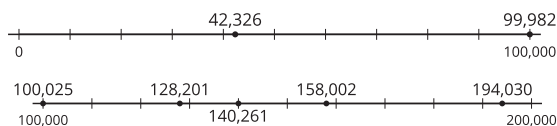
1. Several number lines are posted around the room. Work with your group to decide on which number line each number should go.

Then, estimate the location of the number on that line, put a dot sticker to mark it, and label it with the number.

2. Look at the number line that represents 0 to 100,000 and has two points on it.
 - a. Name two multiples of 10,000 that are closest to each point.
 - b. Of the two multiples of 10,000 you named, which one is the nearest to each point?

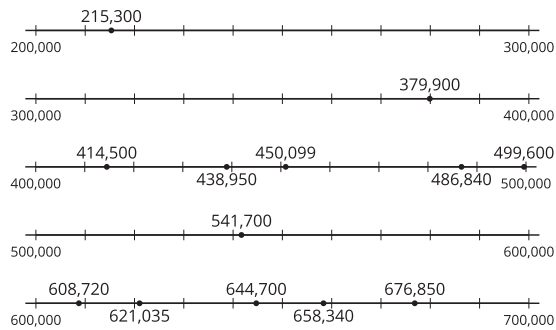
Student Responses

1. Completed number lines:



Launch

- Groups of 4
- “Take a look at the number lines around the room. What do you notice about them? What do you wonder?”
- 30 seconds: quiet think time
- Share responses.
- Display a number line with 100,000 at one end and 200,000 at the other.
- “Do you see multiples of 100,000 in this number line?” (Yes, 100,000 and 200,000)
- “Do you see multiples of 10,000?” (Yes, each tick mark is a multiple of 10,000.) “Let’s name them!” (100,000, 110,000, . . . , 200,000)
- Label the first few tick marks.
- “Do you see multiples of 1,000?” (No, they’re not marked.) “If they were marked, what might they look like?” (10 tiny, equal spaces between each pair of tick marks)]
- “Can you estimate where 113,500 goes on the number line?” (Between the second and third tick marks, but closer to the first tick mark. Or between 110,000 and 120,000, but closer to 110,000.)
- Assign one set of numbers (A, B, C, D, or E) to each group of 4.
- Give 4 stickers and 4 sticky notes to each group.



2. a. 40,000 and 50,000 are the two closest multiples of 10,000 to 42,326, and 90,000 and 100,000 are the two closest multiples of 10,000 to 99,982.
- b. 40,000 is the nearest multiple of 10,000 to 42,326, and 100,000 is the nearest multiple of 10,000 to 99,982.

Activity

- “Work with your group to locate each number on the right number line. Use a sticker to mark the location on the number line and use a sticky note to label it. Then, complete the last problem.”
- 8–10 minutes: group work time
- Monitor for the ways students locate their numbers and how they determine the multiples of 10,000 in the last problem.

Synthesis

- Select students to explain how they identified which number line to use and where to put the dot sticker to represent each number. Highlight explanations that are based on place-value reasoning:
 - To identify the right number line, we’d look at the digit in the hundred-thousands place. If it didn’t have a digit there, it goes on the first number line.
 - To locate the point, we’d look at the digit in the ten-thousands place. For 379,000, it is the 7 in the ten-thousands place, so we’d count 7 tick marks from 300,000. The dot would be close to the eighth tick mark because 79,000 is close to 80,000.
- Briefly discuss how students identified the nearest multiple of 10,000 for 42,326 and 99,982.
- Keep the number lines displayed for the next activity.

Advancing Student Thinking

Students may decide to place all numbers in their assigned set on the same number line. Consider asking:

- “Between which two numbers does each of your numbers fall?”
- “Which number lines have endpoints close to each number?”

Activity 2

🕒 15 min

Closer to Some Multiple

Standards Alignments

Addressing 4.NBT.A.3

In this activity, students identify the nearest multiples of 10,000 and 100,000 for the six-digit numbers they saw in the first activity. They may do so by using the number lines from earlier, but they may also start to notice a pattern in the relationship between the numbers and the nearest multiples without the number lines (MP7).

Access for English Learners

MLR8 Discussion Supports. Display sentence frames to support small-group discussion: “I noticed ____ so I . . .” and “I agree/disagree because”

Advances: Conversing, Representing

Student-facing Task Statement

Use the number line that represents the numbers between 100,000 and 200,000 for this activity.

1. Name the multiple of 10,000 that is the nearest to each number. (Leave the last column blank for now.)

number	nearest multiple of 10,000	
100,025		
128,201		

Launch

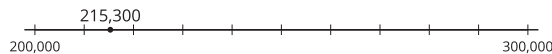
- Groups of 2 or 4
- Display number line with endpoints of 100,000 and 200,000.

Activity

- “Take a few quiet minutes to work on the activity. Then, share your responses with your group.”
- 6–7 minutes: independent work time
- 3–4 minutes: group discussion

number	nearest multiple of 10,000	
140,261		
158,002		
194,030		

2. Here is the number line with 215,300 shown on it. Which multiple of 100,000 is the nearest to 215,300?



3. Label the last column in the table “nearest multiple of 100,000.” Then, name the nearest multiple of 100,000 for each number in the table.

Student Responses

1. Responses for this problem and the last problem:

number	nearest multiple of 10,000	nearest multiple of 100,000
100,025	100,000	100,000
128,201	130,000	100,000
140,261	140,000	100,000
158,002	160,000	200,000
194,030	190,000	200,000

2. 200,000

Synthesis

- Display the blank table from the activity. Invite students to share their responses to complete the table. Discuss any disagreements.
- Invite students to share how they identified the nearest multiples of 10,000 and 100,000.
- If no students mentioned that they examined the location of each point visually and decided the closest tick marks on the number line, ask them about it.

Advancing Student Thinking

Students may see that the nearest multiples of 10,000 for a number are the two tick marks surrounding the point but may be unsure what numbers they represent. Ask them to recall what each tick mark represents on this set of number lines and urge them to count the marks.

Lesson Synthesis

🕒 10 min

“Today we learned to identify multiples of 10,000 and 100,000 that are close to a number.”

Ask students to write a six-digit number.

“Which two multiples of 10,000 are closest to your number? Of the two, which one is the nearest?”

“Which two multiples of 100,000 are closest to your number? Which one is the nearest?”

“Trade your number and its nearest multiples of 10,000 and 100,000 with those of your partner’s.”

“Do you agree that the multiples of 10,000 and 100,000 that they wrote are indeed the nearest ones? Can you tell how they arrived at those multiples?”

Suggested Centers

- Greatest of Them All (1–5), Stage 3: Multi-digit Numbers (Addressing)
- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Supporting)

Complete Cool-Down

Response to Student Thinking

Students may inadvertently disregard the 2 in the ten-thousands place and mistake 627,800 to be between 670,000 and 680,000 on the number line.

Next Day Support

- Before the warm-up, invite students to work in partners to discuss strategies for determining the order of the numbers in this cool-down.

Lesson 15: The Nearest Multiples of 1,000, 10,000, and 100,000

Standards Alignments

Addressing	4.NBT.A.3
Building Towards	4.NBT.A.3

Teacher-facing Learning Goals

- Identify the nearest multiple of 1,000, 10,000, and 100,000 given a multi-digit whole number.

Student-facing Learning Goals

- Let's find multiples of 1 thousand, 10 thousand, and 100 thousand that are the nearest to a number.

Lesson Purpose

The purpose of this lesson is for students to determine the nearest multiple of 1,000, 10,000, and 100,000 and a given multi-digit whole number.

Before this lesson, students named multiples of 10,000 and 100,000 that are near given numbers and identified the closest ones. They reasoned visually—by locating the numbers on a number line and approximating their distance from adjacent tick marks that indicate ten-thousands, or from endpoints that mark hundred-thousands.

In this lesson, students begin to reason numerically—by thinking about the value of the digits in a number to determine its nearest multiple of 1,000, 10,000, and 100,000. They see, for example, that 4,345 is greater than 4,000 but less than 5,000. To determine the multiple of 1,000 that is the nearest to 4,345, they can consider its relationship to 4,500, which is exactly in the middle of 4,000 and 5,000. If it is less than 4,500, it is closer to 4,000. If it is greater than 4,500, then it is closer to 5,000. The number lines play a supporting role here and can be used as needed.

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR8 (Activity 3)

Instructional Routines

Estimation Exploration (Warm-up)

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	10 min
Activity 3	15 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

In grade 3, students learned to round numbers by reasoning about nearby multiples of 10 or 100 on a number line. In the past two lessons, where do you see evidence of students drawing on their earlier experience to reason about nearest multiples of 1,000, 10,000, and 100,000? What ideas or connections might need to be made explicit before they begin rounding large numbers in upcoming lessons?

Cool-down (to be completed at the end of the lesson)

🕒 5 min

The Nearest Multiples

Standards Alignments

Addressing 4.NBT.A.3

Student-facing Task Statement

1. Find each nearest multiple for the number 248,640. Use the number lines if they are helpful.

a. The nearest multiple of 100,000 is _____.



b. The nearest multiple of 10,000 is _____.



c. The nearest multiple of 1,000 is _____.



2. What is the nearest multiple of 1,000 and multiple of 10,000 for the number 173,500?

Student Responses

1.
 - a. 200,000
 - b. 250,000
 - c. 249,000

2. Sample responses:

- There are two nearest multiples of 1,000: 173,000 and 174,000. The nearest multiple of 10,000 is 170,000.
- The nearest multiple of 1,000 is 174,000.

----- Begin Lesson -----

Warm-up

🕒 10 min

Estimation Exploration: What Could It Be?

Standards Alignments

Building Towards 4.NBT.A.3

The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information. In this case, students rely on their familiarity with number lines and their understanding of numbers within 1,000 to estimate the value represented by a point on a number line. The reasoning here prepares students to think about the halfway point between two benchmark values as a way to estimate numbers.

Instructional Routines

Estimation Exploration

Student-facing Task Statement

What number could this point represent?



Record an estimate that is:

too low	about right	too high

Launch

- Groups of 2
- Display image.
- “What is an estimate that’s too high? Too low? About right?”
- 1 minute: quiet think time

Activity

- “Discuss your thinking with your partner.”

Student Responses

Sample responses:

- Too low: 0–500
- About right: 600–700
- Too high: 800–1,000

- 1 minute: partner discussion
- Record responses.

Synthesis

- Consider asking: “Is anyone’s estimate less than 500? Is anyone’s estimate greater than 800?”
- “How did you go about making an estimate when only 0 and 1,000 are shown on the line?”
- If no students mentioned using the halfway point or 500 as a reference, ask them about it.
- “How did the midpoint for 500 help you make an estimate?”
- Consider asking: “Did anyone partition the space between 500 to 1,000 into smaller spaces? How did that help you estimate?”

Activity 1

🕒 20 min

Closer to This or That?

Standards Alignments

Addressing 4.NBT.A.3

This activity transitions students from reasoning visually to reasoning numerically about the nearest multiples of 1,000, 10,000, and 100,000. Students identify the nearest multiples of 10, 100, 1,000, 10,000 and 100,000 for a series of related numbers—16, 816, 3,816, 73,816, and 573,816—and use number lines to support their thinking as needed. Tables are used to highlight the idea that a given number can be closest to a smaller number or a greater number depending on the place attended to. For example, for 816, the nearest multiple of 10 is 820 and the nearest multiple of 100 is 800.

For students, rounding to the unit in the leftmost place is not usually an issue, but rounding to the unit represented by a place in the middle of a number often is, as the nearby digits can be distracting. (For example, rounding 573,816 to the nearest 1,000 is more difficult than rounding to the nearest 100,000.) This activity allows students to work with a set of related numbers that

grows by an additional digit each time, and gives them a way to think of a large number as composed of smaller place-value parts, each of which they can manage to round.

Access for Students with Disabilities

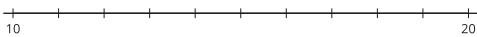
Representation: Internalize Comprehension. Synthesis: Invite students to explain how they would find a nearest multiple without using a number line in their own words. Consider inviting them to make a visual display or reference document for themselves or each other.

Supports accessibility for: Conceptual Processing, Language, Memory

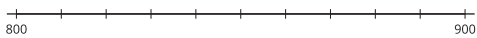
Student-facing Task Statement

1. Answer each question. Use the number lines if they are helpful.

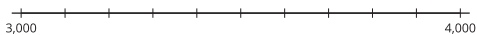
- a. Is 16 closer to 10 or to 20?



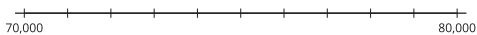
- b. Is 816 closer to 800 or to 900?



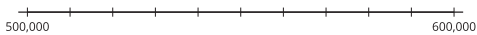
- c. Is 3,816 closer to 3,000 or 4,000?



- d. Is 73,816 closer to 70,000 or 80,000?



- e. Is 573,816 closer to 500,000 or 600,000?



2. For 816:

- The nearest multiple of 1,000 is 1,000.
- The nearest multiple of 100 is 800.
- The nearest multiple of 10 is 820.

Complete the table with the nearest multiple of 10, 100, 1,000, 10,000, and 100,000 for each number.

Launch

- Groups of 2

Activity

- “Work on the activity independently for a few minutes. Then, share your responses with your partner.”
- 6–7 minutes: independent work time
- 3–4 minutes: partner discussion

Synthesis

- Display the blank table from the activity. Invite students to share their responses to complete the table. Discuss any disagreements.
- “How might we tell the nearest multiple of 1,000 for 573,816 without using a number line?” (Sample responses:
 - Find two multiples of 1,000 that are closest to the number, one that is greater and one that is less. For 573,816, they are 573,000 and 574,000. If the number is less than their midpoint, 573,500, then it is closer to the lower multiple of 1,000. If it is more than 573,500, then it is closer to the higher one.
 - Look at the value of the digits to the

nearest multiple of ...	10	100	1,000	10,000	100,000
16		--	--	--	--
816	820	800	1,000	--	--
3,816				--	--
73,816					
573,816					

right of the thousands—the hundreds, tens, and ones. If it is less than 500, then it is closer to the lower multiple of 1,000. If it is more than 500, then it is closer to the higher multiple of 1,000.)

Student Responses

- 20
 - 800
 - 4,000
 - 70,000
 - 600,000
-

nearest multiple of ...	10	100	1,000	10,000	100,000
16		--	--	--	--
816	820	800	1,000	--	--
3,816	3,820	3,800	4,000	--	--
73,816	73,820	73,800	74,000	70,000	100,000
573,816	573,820	573,800	574,000	570,000	600,000

Activity 2 (optional)

🕒 10 min

Closer to Which Number?

Standards Alignments

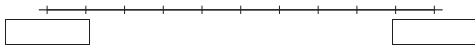
Addressing 4.NBT.A.3

This optional activity gives students another opportunity to practice identifying multiples of some powers of 10 that border a given number and identify the nearest ones. As before, students may use number lines to support their reasoning, but here the number lines are unlabeled.

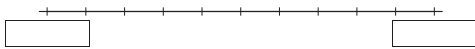
Student-facing Task Statement

1. Answer each question. Label and use the number lines if they are helpful.

- a. Is 425,193 closer to 400,000 or 500,000?



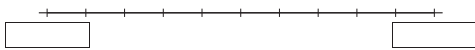
- b. Is 425,193 closer to 420,000 or 430,000?



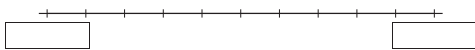
- c. Is 425,193 closer to 425,000 or 426,000?



- d. Is 425,193 closer to 425,100 or to 425,200?



- e. Is 425,193 closer to 425,190 or to 425,200?



2. For the number 425,193:

- The nearest multiple of 100,000 is _____.
- The nearest multiple of 10,000 is _____.
- The nearest multiple of 1,000 is _____.
- The nearest multiple of 100 is _____.
- The nearest multiple of 10 is _____.

Student Responses

1. a. 400,000

Launch

- Groups of 2

Activity

- “Work independently for a few minutes. Then, discuss your responses with your partner.”
- 5 minutes: independent work time
- 2 minutes: partner discussion

Synthesis

- Invite students to share their responses and reasoning.
- “Which nearest multiples were you able to identify fairly easily?”
- “Which were a bit more challenging, if any? Why might that be?”

- b. 430,000
 - c. 425,000
 - d. 425,200
 - e. 425,190
2. Same responses as in the first problem.

Activity 3

🕒 15 min

What's the Nearest Multiple?

Standards Alignments

Addressing 4.NBT.A.3

In this activity, students encounter numbers that are exactly between two consecutive multiples and thus are closer to neither multiple (or have two nearest multiples). This offers students an opportunity to construct different viable arguments, support them, and critique the reasoning of others (MP3).

Some students may bring up the convention of rounding up that they learned in grade 3, but if not, it is not necessary to remind them during the activity synthesis. This convention is discussed in a later lesson. It is acceptable at this point for students to say that there are two nearest multiples of 100 or that there are none.

Access for English Learners

MLR8 Discussion Supports. Synthesis: Provide students with the opportunity to rehearse with a partner what they will say before they share with the whole class.

Advances: Speaking

Student-facing Task Statement

1. For the number 136,850, Han can name the nearest multiple of 100,000, 10,000, and 1,000.

He is stuck when trying to name

Launch

- Groups of 2
- Give students access to blank number lines.

the nearest multiple of 100.



nearest multiple of ...	100,000	10,000	1,000
136,850			

- In the table, write the nearest multiples that Han knows for each place value. Use number lines if they are helpful.
 - Why might it be tricky to name the nearest multiple of 100 for 136,850? What do you think it is?
- Name the nearest multiples of 100,000, 10,000, 1,000, and 100 for each number.

nearest multiple of ...	100,000	10,000	1,000	100
191,530				
70,500				

Student Responses

- Completed table:

nearest multiple of ...	100,000	10,000	1,000
136,850	100,000	140,000	137,000

- Sample response: 136,850 is exactly in the middle of 136,800 and 136,900. It's not closer to one or the other. I think we can't name the nearest multiple of 100. (Or, I think, we can just say the nearest multiple is 136,900.)

- Completed table:

Activity

- “Work with your partner on the first problem. Pause before continuing to the second set.”
- 4–5 minutes: group work time on the first set of problems
- Pause for a whole-class discussion.
- Invite students to share their responses for part b. Discuss how 136,850 is different from other numbers they've seen so far and what students think the nearest multiple of 100 is.
- “Let's find the nearest multiples for some other numbers and see if we come across other cases where there is not a single nearest multiple.”
- “Take a few quiet minutes to work on the last problem.”
- 3–5 minutes: quiet work time

Synthesis

- “Were there times when you couldn't identify one nearest multiple? When?” (When finding the nearest multiple of 1,000 for 70,500.) “Why was there not one nearest multiple?” (70,500 is exactly halfway between 70,000 and 71,000.)
- “We see 5 in the hundreds place for 191,530. Does this number also have no single nearest multiple of 1,000?” (It does have one, 192,000. The 30 makes it greater than the halfway point between 191,000 and 192,000.)

nearest multiple of . . .	100,000	10,000	1,000	100
191,530	200,000	190,000	192,000	191,500
70,500	100,000	70,000	70,000 or 71,000	70,500

Advancing Student Thinking

Students may be unsure how to find the nearest multiple of 100 for 70,500 because they assume that a nearest multiple of a power of ten must be different than the number itself. Consider asking them to count by 100 from 70,000, recording each counted number, and stopping after 70,600 or 70,700. Ask them which of the written multiples of 100 is the nearest to 70,500.

Lesson Synthesis

🕒 10 min

“Today we learned to find the nearest multiple of 1,000, 10,000, and 100,000 for some large numbers. Let’s revisit the strategies we used.”

“How would you go about finding the nearest multiple of 100,000 for a number like 318,495?” Consider providing some sentence frames: “First, I would. . . Next, I would . . . Then, I would . . .”

“What about the nearest multiples of 10,000 and 1,000?”

“Does the number 318,500 have the same nearest multiples of 1,000, 10,000, and 100,000 as 318,495? Why or why not?” (It has the same nearest multiples of 100,000 and 10,000, but not the same nearest multiple of 1,000. The nearest multiple of 1,000 for 318,495 is 318,000, but for 318,500, there are two multiple of 1,000 that are the same distance away: 318,000 and 319,000.)

Suggested Centers

- Greatest of Them All (1–5), Stage 3: Multi-digit Numbers (Addressing)
- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Supporting)

----- Complete Cool-Down -----

Response to Student Thinking

Students may identify the nearest multiple of 10,000 for 248,640 as 50,000 instead of 250,000, or the nearest multiple of 1,000 for 248,640 as 9,000 instead of 249,000. They may focus on the digits in the right places to find the nearest 10,000 or 1,000, but neglect the fact that the number is actually in the 200,000s.

Next Day Support

- Before the warm-up, invite students to use a number line to explain the claim that 248,640 is closest to 9,000. Ask students what makes sense about the claim and what might be missing.

Lesson 16: Round Numbers

Standards Alignments

Addressing 4.NBT.A.3

Teacher-facing Learning Goals

- Round multi-digit whole numbers to the nearest 1,000, 10,000, and 100,000.

Student-facing Learning Goals

- Let's round some large numbers.

Lesson Purpose

The purpose of this lesson is for students to round multi-digit whole numbers within 1,000,000 to the nearest 1,000, 10,000, and 100,000.

In grade 3, students rounded whole numbers to the nearest 10 and 100. In previous lessons, they worked to find the closest multiples of powers of 10. Here, students build on this work to round whole numbers to the nearest 1,000, 10,000, and 100,000. Students revisit the convention of rounding up when a number is exactly halfway between two consecutive multiples of a power of 10.

Access for:

Students with Disabilities

- Action and Expression (Activity 2)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Number Talk (Warm-up)

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Activity 3	20 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

How readily did students transition from reasoning about nearest multiples using number lines to reasoning numerically and rounding? What progress have you seen them make in using representations flexibly to support their thinking? What did students say or do that showed this progress?

Cool-down (to be completed at the end of the lesson)

🕒 5 min

Round Three Ways

Standards Alignments

Addressing 4.NBT.A.3

Student-facing Task Statement

Round 569,003 to the nearest 100,000, 10,000 and 1,000. Explain or show your reasoning.

Student Responses

- 600,000. It's closer to 600,000 because it's more than 550,000.
- 570,000. It's less than 1,000 away from 570,000.
- 569,000. It is only 3 away from 569,003.

----- **Begin Lesson** -----**Warm-up**

🕒 10 min

Number Talk: Missing Numbers

Standards Alignments

Addressing 4.NBT.A.3

This Number Talk encourages students to think about the distance of a number to a multiple of 100, 1,000, and 10,000 by relying on the structure of numbers in base-ten to mentally find differences (MP7). The understandings elicited here will be helpful later in the lesson when students round multi-digit whole numbers. It may be helpful to record students' reasoning on number lines.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value that makes each equation true mentally.

- $421 + \underline{\hspace{2cm}} = 500$
- $421 + \underline{\hspace{2cm}} = 1,000$
- $6,421 + \underline{\hspace{2cm}} = 7,000$
- $6,421 + \underline{\hspace{2cm}} = 10,000$

Student Responses

- 79: 420 is 80 away from 500, so 421 must be 79 away from 500.
- 579: 1,000 is 500 away from 500, and 500 is 79 away from 421.
- 579: 6,421 is 79 away from 6,500, and 6,500 is 500 away from 7,000.
- 3,579: it's like the last one but you need to add another 3,000 to get from 7,000 to 10,000.

Launch

- Display one equation.
- “Give me a signal when you have an answer and can explain how you got it.”
- 1 minute: quiet think time

Activity

- Record answers and strategy.
- Keep equations and work displayed.
- Repeat with each equation.

Synthesis

- “What do all four equations have in common?” (They are about finding how far away a number is to a multiple of 100, 1,000, or 10,000. The number on the left side of the equation is 421 or ends with 421.)
- “Is 500 the nearest multiple of 100 for 421? How do you know?” (No, 421 is closer to 400. It is 21 away from 400 and 79 from 500.)
- “Is 7,000 the nearest multiple of 1,000 for 6,421?” (No, 6,421 is closer to 6,000.)
- “Is 10,000 the nearest multiple of 10,000 for 6,421?” (Yes, 10,000 is less than 5,000 away from 6,421.)

Activity 1

 20 min

Round to What?

 PLC Activity

Standards Alignments

Addressing 4.NBT.A.3

In this activity, students connect the idea of “nearest multiple” to rounding. They are reminded that to round to the nearest 1,000, 10,000, or 100,000 is to find the nearest multiples of these values. When they find all of the numbers that round to a given number, students need to think

carefully about place value and may choose to use a number line to support their reasoning (MP5).

Student-facing Task Statement

Noah says that 489,231 can be rounded to 500,000.

Priya says that it can be rounded to 490,000.

1. Explain or show why both Noah and Priya are correct. Use a number line if it helps.
2. Describe all the numbers that round to 500,000 when rounded to the nearest hundred-thousand.
3. Describe all the numbers that round to 490,000 when rounded to the nearest ten-thousand.
4. Name two other numbers that can also be rounded to both 500,000 and 490,000.

Student Responses

Sample response:

1. Noah was rounding 489,231 to the nearest hundred-thousand, which is 500,000, and Priya was rounding to the nearest ten-thousand, which is 490,000.
2. Any number that is 450,000 or greater and is no more than 549,999.
3. Any number that is 485,000 or greater and is no more than 494,999.
4. 491,580 and 493,800. (Any number that is at least 485,000 and at most 494,999 meets this condition.)

Launch

- Groups of 2
- “What do you know about rounding?”
- 1 minute: quiet think time
- Share and record responses.
- Highlight responses that share times when students need to round numbers in their life.
- “What is 112 rounded to the nearest 10?” (110) “To the nearest 100?” (100)
- “Let’s round some larger numbers.”

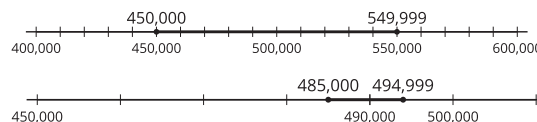
Activity

- “Work with your partner to complete the activity.”
- 10 minutes: partner work time
- Monitor for students who consider all numbers that could be rounded to 490,000, to 500,000, and to both by:
 - drawing a number line
 - reasoning numerically

Synthesis

- Display the number line from the activity.
- Select students to share their responses and reasoning for the first three problems. Record their responses.
- If no students mentioned using number lines to help them identify all the possible numbers that round to 500,000 and 490,000, ask them to try showing the ranges on the number line.
- Display students’ annotated number lines

or the following:



- “How did you find numbers that can be rounded to both 500,000 and 490,000?” (I chose numbers that are between 485,000 and 494,999, since all of them can be rounded to 500,000. Numbers outside of that interval cannot be rounded to 490,000.)

Advancing Student Thinking

Students may be able to list some numbers that can be rounded to 500,000 (or 490,000) but may be unsure how to describe all of them. Encourage them to consider the upper and lower limits of the possible numbers by asking:

- “Which numbers *cannot* be rounded to 500,000 because they are too low?”
- “Which numbers *cannot* be rounded to 500,000 because they are too high?”

Activity 2

🕒 15 min

Some Numbers to Round

Standards Alignments

Addressing 4.NBT.A.3

In this activity, students round numbers to various place values. Here they encounter for the first time a number that rounds to 1,000,000 and some that round to 0. (For example, 4,896, rounded to the nearest 100,000 is 0.) Students may wonder why we might round a number in the thousands to the nearest 100,000. Make note of such ideas to discuss in the next lesson where students explore rounding in context and see that it often involves giving meaningful information.

Access for English Learners

MLR8 Discussion Supports. Prior to solving the problems, invite students to make sense of the situations and take turns sharing their understanding with their partner. Listen for and clarify any questions about the context.

Advances: Reading, Representing

Access for Students with Disabilities

Action and Expression: Develop Expression and Communication. Provide access to blank pre-formatted number lines (with ten tick marks but no labels). Invite students who use the number lines to draw connections to more abstract strategies.

Supports accessibility for: Conceptual Processing, Organization, Fine Motor Skills

Student-facing Task Statement

Your teacher will show you six numbers. Choose at least three numbers and round each to the nearest 100,000, 10,000, 1,000, and 100.

Record your work in the table. Use a number line if it is helpful.

round to the nearest ...	100,000	10,000	1,000	100
53,487				
4,896				
370,130				
96,500				
985,411				
7,150				

Student Responses

round to the nearest ...	100,000	10,000	1,000	100
53,487	100,000	50,000	53,000	53,500
4,896	0	0	5,000	4,900
370,130	400,000	370,000	370,000	370,100
96,500	100,000	100,000	97,000	96,500
985,411	1,000,000	990,000	986,000	985,400
7,150	0	10,000	7,000	7,200

Launch

- Groups of 2
- Display the table.
- “With your partner, choose at least three numbers—one with four digits, one with five digits, and one with six digits. Round them to the nearest values in the table.”

Activity

- “Work with your partner on the first two numbers and independently on at least one of them. Be prepared to explain or show your thinking.”
- 6–8 minutes: partner work

Synthesis

- Display the blank table from the activity. Invite students to share their responses to complete the table. Discuss any disagreements.
- “The number 96,500 is the same distance from 96,000 and 97,000. How do we know which way to go if rounding to the nearest thousand?” (By convention, we round up.)

Activity 3 (optional)

🕒 20 min

Rounded Populations

Standards Alignments

Addressing 4.NBT.A.3

In this optional activity, students round multi-digit whole numbers in the context of population. They describe the effect of rounding large numbers to different places and how the rounded values may illuminate or obscure a situation, and may help or hinder problem solving. Along the way, students engage in aspects of mathematical modeling (MP4).

Student-facing Task Statement

The table shows the estimated populations of two cities in the United States, based on surveys in 2018.

city	population	rounded to the nearest 1,000,000	rounded to the nearest 100,000	rounded to the nearest 10,000
Austin, TX	964,254			960,000
Lincoln, NE	287,401			
		1,000,000		900,000
		1,000,000	900,000	
		0	500,000	

Here are three other cities and their estimated populations:

- Charlotte, NC: 872,498
- Jacksonville, FL: 903,889
- Virginia Beach, VA: 450,189

1. Match each of the three cities with the rounded populations in the table.
2. The table shows three ways of rounding

Launch

- Groups of 2–4
- Display this table:

city	population	rounded to the nearest 1,000,000	rounded to the nearest 100,000	rounded to the nearest 10,000
Oakland, CA	429,082	0	400,000	430,000
Mesa, AZ	508,958	1,000,000	500,000	510,000

- “What do you notice? What do you wonder?”
- 1 minute: quiet think time
- Share responses.
- “When might it be helpful to have the actual population? When might it be helpful to have the rounded numbers?” (Sample responses:
 - Rounding to the nearest million doesn’t quite make sense. It portrays the population either as 0—for Oakland—or as almost twice as large—for Mesa.)
 - Counting every single person may not be possible.

large numbers.

- To get a rough idea of how many people are in these cities, which ways of rounding seem appropriate?
- To compare the populations or put them in order by size, which ways of rounding are more helpful? Less helpful?

Student Responses

- Completed table:

city	population	rounded to the nearest 1,000,000	rounded to the nearest 100,000	rounded to the nearest 10,000
Austin, TX	964,254	1,000,000	1,000,000	960,000
Lincoln, NE	287,401	0	300,000	290,000
Jacksonville, FL	903,889	1,000,000	900,000	900,000
Charlotte, NC	872,489	1,000,000	900,000	870,000
Virginia Beach, VA	450,189	0	500,000	450,000

- Sample responses:

- Rounding to the nearest 100,000 or 10,000 seems to work well for all cities. Rounding to the nearest 1,000,000 works fine if the population is around 900,000.
- Rounding to 10,000 is helpful for comparison without losing too much information. Rounding to 100,000 can work but in some cases it is not possible to compare. (For example, Charlotte and Jacksonville both round to 900,000, but Jacksonville has 30,000 or so more people than Charlotte.) Rounding to 1,000,000 doesn't really help.

- Rounding to the nearest 100,000 or 10,000 seems appropriate.)

- "Let's round some other populations and see if we still think the same way."

Activity

- "Match the populations of Charlotte, Jacksonville, and Virginia Beach to the rounded numbers in the table. Then, complete the table."
- "Work with your group to complete the activity. Be prepared to explain how you make your matches."
- 6–8 minutes: group work time
- Monitor for the ways students reason about the given populations and the rounded numbers.

Synthesis

- Select groups to share the matches they made and their reasoning.
- Display the completed table.
- Invite students to briefly share their responses to the last problem, using the table to aid their explanations.
- Point out that, in reality, it is unlikely to accurately count the exact number of people in a state. Highlight that rounding can be a useful way to get a sense of a quantity, but it requires making some decisions about what is most meaningful in a situation.

Lesson Synthesis

🕒 10 min

Display the completed table from a previous activity.

round to the nearest . . .	100,000	10,000	1,000	100
53,487	100,000	50,000	53,000	53,500
4,896	0	0	5,000	4,900
370,130	400,000	370,000	370,000	370,100
96,500	100,000	100,000	97,000	96,500
985,411	1,000,000	990,000	985,000	985,400
7,150	0	10,000	7,000	7,200

“What do you notice? What do you wonder?”

“Why does 370,130 round to the same number when rounded to the nearest 10,000 and 1,000?” (The nearest multiple of 1,000 and the nearest multiple of 10,000 happen to be the same number—370,000.)

“Why does 4,896 round to 0?” (It is closer to 0 than to the next closest multiple of 10,000 or of 100,000. It is more than 5,000 away from 10,000, and more than 50,000 away from 100,000.)

“Why does 985,411 round to 1,000,000 instead of a six-digit number in the hundred-thousands?” (1,000,000 is its nearest multiple of 100,000.)

Suggested Centers

- Mystery Number (1–4), Stage 5: Six-digit Numbers (Addressing)
- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Supporting)

Complete Cool-Down

Response to Student Thinking

Students use the digit in the hundred-thousands place to round to the nearest 100,000, use the

Next Day Support

- Launch the lesson by asking students to

digit in the ten-thousands place to round to the nearest 10,000, and so on, neglecting to consider the value of the digits that follow. (For instance, seeing the 5 in 569,003, they round it to 500,000, and seeing the 6, they round it to 560,000.)

recap how we determine the nearest multiple when rounding.

Lesson 17: Apply Rounding

Standards Alignments

Addressing	4.NBT.A.3
Building Towards	4.NBT.A.3

Teacher-facing Learning Goals

- Describe how rounding can help or hinder problem-solving.
- Round multi-digit whole numbers within 1,000,000 to solve problems.

Student-facing Learning Goals

- Let's round large numbers to learn about situations and solve problems.

Lesson Purpose

The purpose of this lesson is for students to use rounding to learn about situations and solve problems involving multi-digit whole numbers within 1 million.

Previously, students extended their knowledge of rounding to the nearest 1,000, 10,000, and 100,000. They began to generalize strategies for rounding any number within 1,000,000 to any place. In this lesson, students practice rounding such numbers and interpret the rounded numbers in context in order to solve problems. In doing so, they practice reasoning quantitatively and abstractly (MP2). Students also learn the benefits and limitations of rounding numbers when solving problems.

This lesson has a Student Section Summary.

Access for:

Students with Disabilities

- Engagement (Activity 2)

English Learners

- MLR7 (Activity 2)

Instructional Routines

Notice and Wonder (Warm-up)

Lesson Timeline

Warm-up	10 min
Activity 1	20 min

Teacher Reflection Question

What surprised you about students' thinking in today's activities? What reasoning strategies did you anticipate? What did you not anticipate?

Activity 2	15 min
Activity 3	15 min
Lesson Synthesis	10 min
Cool-down	5 min

Cool-down (to be completed at the end of the lesson)

 5 min

Spatial Distancing

Standards Alignments

Addressing 4.NBT.A.3

Student-facing Task Statement

Planes are too close when their altitudes are within 1,000 feet of each other when they fly over the same area.

- Jada says planes C and E are too close.
- Noah says planes C and E are a safe-distance apart.

Use rounding to explain how both statements might be correct.

plane	altitude (feet)
A	40,990
B	39,524
C	36,138
D	40,201
E	35,472
F	30,956

Student Responses

Sample response: Jada might have thought about the actual distance between the two planes, which is only about 700 feet apart, or might have rounded to the nearest hundred (C would round to 36,100 and E to 35,500). If Noah rounded to the nearest thousand, plane C would round to 36,000 and E would round to 35,000, which is 1,000 feet apart.

Warm-up

 10 min

Notice and Wonder: Plane Altitudes

Standards Alignments

Building Towards 4.NBT.A.3

This warm-up prompts students to make sense of a problem before solving it, by familiarizing themselves with a context and the mathematics that might be involved. This warm-up gives students a chance to analyze and ask questions about the set of data they will use in a later activity.

Instructional Routines

Notice and Wonder

Student-facing Task Statement

What do you notice? What do you wonder?

plane	altitude (feet)
WN11	35,625
SK51	28,999
VT35	15,450
BQ64	36,000
AL16	31,000
AB25	35,175
CL48	16,600
WN90	30,775
NM44	30,245

Student Responses

Students may notice:

- All the numbers are in the ten-thousands or are five-digit numbers.
- The planes are identified with a name with two letters and two numbers.
- All the altitudes are between 15,000 and 36,000 feet.
- The altitudes have 0, 5, or 9 in the ones place.

Students may wonder:

Launch

- Groups of 2
- Display the image.
- “What do you notice? What do you wonder?”
- 1 minute: quiet think time

Activity

- “Discuss your thinking with your partner.”
- 1 minute: partner discussion
- Share and record responses.

Synthesis

- Explain that altitude is the distance of an object from sea level. Most commercial planes that carry passengers fly at an altitude between 33,000 and 41,000 feet. An altitude of 35,000 feet (7 miles) is typical. Lighter airplanes tend to fly at lower altitudes, around 10,000 feet.
- “Which of these airplanes might be smaller aircrafts? Which might be larger passenger planes?”

- What does “altitude” mean?
- How can we tell what the altitude of a plane is?
- Where is the measurement taken from? If a plane doesn’t change its position up or down but flies over a mountain or a valley, does the altitude change?
- What if more than one plane is at the same altitude? Is that dangerous?

Activity 1

🕒 20 min

Apart in the Air

Standards Alignments

Addressing 4.NBT.A.3

In this activity, students make sense of a situation and decide how to round the quantities in it. They see that their interpretation of the problems and their rounding decisions affect their solutions to the problems. When students describe how they see their rounded quantities in relation to the context, they are thinking abstractly and quantitatively (MP2).

For instance, when answering the first question, students may say that the altitudes of several planes (SK51, AB25, and WN90) are not “about 30,000 feet” because when rounded to the nearest thousand, they round to different numbers. They may consider them differently when they are rounded to the nearest ten-thousand.

The second question prompts students to start considering the implications of using rounded values to solve problems. At this point, it is not necessary for students to clearly articulate why Mai’s suggestion of using rounded altitudes is not reliable for keeping a safe distance between planes. In the next activity, students will look more closely at the implications of rounding in the same context.

Student-facing Task Statement

1. Altitude is the vertical distance from sea level. Here are the altitudes of ten planes.

Launch

- Groups of 2–4
- “Have you wondered how many planes are

plane	altitude (feet)	
WN11	35,625	
SK51	28,999	
VT35	15,450	
BQ64	36,000	
AL16	31,000	
AB25	35,175	
CL48	16,600	
WN90	30,775	
NM44	30,245	



Which planes are flying at about 30,000 feet? Explain or show your reasoning.

- Planes flying over the same area need to stay at least 1,000 feet apart in altitude.

Mai said that one way to tell if planes are too close is to round each plane's altitude to the nearest thousand. Do you agree that this is a reliable strategy?

In the last column, round each altitude to the nearest thousand. Use the rounded values to explain why or why not.

Student Responses

- Sample response: SK51, AL16, AB25, WN90, and NM44. I checked to see which flights would round to 30,000 when rounded to the nearest 10,000.
- Disagree. Sample response: The rounded altitudes might be 1,000 feet apart, but the actual altitudes are less than 1,000 feet apart. For example, the altitudes of WN90 and NM44 round to 31,000 and 30,000, but the actual altitudes are only 530 feet apart.

plane	altitude (feet)	rounded to the nearest thousand
WN11	35,625	36,000
SK51	28,999	29,000
VT35	15,450	15,000
BQ64	36,000	36,000

in the air at any given time? What would be your estimate?"

- 30 seconds: Share estimate with a partner.
- Share and record responses.
- "One data source reported that, in 2017, the number of planes that are in the sky at the same time ranged from about 3,300 (when it is the least busy) to over 12,000 (at peak times)!"
- "With that many planes in flight at once, it is extremely important for planes to keep a safe distance from one another, especially around busy airports."

Activity

- "Work with your group to complete the activity."
- 8–10 minutes: group work time
- Monitor for the different ways students decide whether a number is "about 30,000" and test the validity of Mai's strategy.

Synthesis

- Invite students to share their responses to the first question. Discuss reasons for any disparity in students' lists.
- "How did you decide which numbers to include in your list of 'about 30,000 feet' and which to exclude?" (Sample responses:
 - Rounded all numbers to the nearest 10,000.
 - Excluded numbers less than 20,000 and more than 35,000, and then rounded numbers in the rest to the nearest 1,000.)
- Point out that students may answer the question differently depending on how they round the numbers.
- "Who can give an example that shows that Mai's strategy works? How about one that

plane	altitude (feet)	rounded to the nearest thousand
AL16	31,000	31,000
AB25	35,175	35,000
CL48	16,600	17,000
WN90	30,775	31,000
NM44	30,245	30,000

shows it doesn't work?"

Advancing Student Thinking

Students may rely on intuition or may not use a consistent strategy to decide if the planes' altitudes are "about 30,000 feet." For instance, they might say, "All the numbers in the 30 or 31 thousands look close enough to 30,000." Consider asking: "What counts as 'close enough?'" and "Is 33,975 or 28,999 close enough?" Encourage them to think of a more consistent way to decide.

Activity 2

🕒 15 min

Safe or Unsafe?

Standards Alignments

Addressing 4.NBT.A.3

In this activity, students continue to consider rounding in the same context as in the first activity. Students think about why rounding the altitudes to the nearest 1,000 may make it appear that two planes are a safe distance apart while the exact altitudes may show otherwise.

As they consider different ways and consequences of rounding in this situation, students practice reasoning quantitatively and abstractly (MP2) and engage in aspects of mathematical modeling (MP4).

Access for English Learners

MLR7 Compare and Connect. Synthesis: Lead a discussion comparing, contrasting, and connecting the different representations. Ask, “Are there any benefits or drawbacks to one representation compared to another?” and “How do these different representations show the same information?”.

Advances: Representing, Conversing

Access for Students with Disabilities


Engagement: Provide Access by Recruiting Interest. Synthesis: Invite students to generate a list of additional examples of real-life rounding that connect to their personal backgrounds and interests.

Supports accessibility for: Conceptual Processing, Memory, Social-Emotional Functioning

Student-facing Task Statement

Use the altitude data table from earlier for the following problems.

1. Look at the column showing exact altitudes.


 - a. Find two or more numbers that are within 1,000 feet of one another. Mark them with a circle or a color.
 - b. Find another set of numbers that are within 1,000 feet of one another. Mark them with a square or a different color.
 - c. Based on what you just did, which planes are too close to one another?
2. Repeat what you just did with the rounded numbers in the last column. If we look there, which planes are too close to one another?
3. Which set of altitude data should air traffic controllers use to keep airplanes safe while in the air? Explain your reasoning.

Launch

- Groups of 2–4
- “How do you think pilots know whether their plane is too close to another plane while in the air?”
- 30 seconds: quiet think time
- Share and record responses.
- Explain air traffic controllers are a group of people whose job is to monitor air traffic, including to track the positions of all the planes and the distances between them.
- Consider showing an image of an air traffic control room and controllers.

Activity

- “Take a few quiet minutes to work on the first three problems. Then, share your responses with your group and work on the last problem together.”
- 5 minutes: independent work time
- 5 minutes: group work time

4. Are there better ways to round these altitudes, or should we not round at all? Explain or show your reasoning.

Student Responses

Sample symbol-coded table for the first two problems:

plane	altitude(feet)	rounded to the nearest thousand
WN11	⊙ 35,625	⊙ 36,000
SK51	28,999	29,000
VT35	15,450	15,000
BQ64	⊙ 36,000	⊙ 36,000
AL16	■ 31,000	■ 31,000
AB25	⊙ 35,175	35,000
CL48	16,600	17,000
WN90	■ 30,775	■ 31,000
NM44	■ 30,245	30,000

- a and b: See table.
c. WN11, BQ64, and AB25 are all within 1,000 feet of each other, so are AL16, WN90, and NM44.
- If we look at the rounded numbers, WN11 and BQ64 are too close to each other, and AL16 and WN90 are too close.
- Sample response: They should use the exact numbers. If they use the numbers rounded to the nearest thousand, they would've missed the fact that AB25 and WN11 are less than 500 feet from another, and that WN90 and NM44 are only 530 feet apart.
- Sample response: We could round to the nearest ten. That way, we can still tell if they are at least 1,000 feet apart but don't have to deal with the digits in the ones place.

Synthesis

- Select a previously identified student to share their symbol- or color-coded table, or display the table in the Student Responses.
- Invite the class to share their responses to the question of which set of data air traffic controllers should use.
- Discuss students' ideas on whether there were better ways to round the altitudes or to round at all.
- Explain that air traffic controllers in fact rely on technology and computers to calculate exact distances between planes.

Activity 3 (optional)

🕒 15 min

No-phone Zone?

Standards Alignments

Addressing 4.NBT.A.3

This optional activity offers students another opportunity to round numbers and solve new problems in the context of airplane altitudes. They analyze some statements made about the quantities in the given situation and consider how rounding might have led to those conclusions. Along the way, students practice constructing logical arguments and critiquing those of others (MP3). They also engage in aspects of mathematical modeling (MP4).

Student-facing Task Statement

In some countries, cell phone use is allowed on a flight only when the plane is at a certain altitude, usually around 40,000 feet.

Here are six planes and their altitudes.

plane	altitude (feet)
A	40,990
B	39,524
C	36,138
D	40,201
E	35,472
F	30,956

Jada says the passengers in all planes except for plane F can use their phones.

Elena says only those in B and D can do so.

Do you agree with either of them? Explain your reasoning.

Student Responses

Sample responses:

- Agree with Jada. The altitudes of planes A, B, C, D, and E, rounded to the nearest 10,000, are all 40,000.
- Agree with Elena. If we round to the

Launch

- Groups of 2–4
- Explain to students that, in the United States, air passengers are not permitted to use their cell phones from take-off until landing because phone signals can interfere with flight communication signals. However, this hasn't always been true. There had been a time when phone use was allowed after the plane reached a certain altitude. Some countries still allow phone use based on the altitude of the plane.
- Display the table.
- “What do you notice? What do you wonder?”
- 30 seconds: quiet think time
- 1 minute: partner discussion

Activity

- “Take a few quiet minutes to work on the task. Then, share your thinking with your

altitudes of B and D to the nearest 1,000, we get 40,000.

- Agree with both. It depends on whether we round the altitudes to the nearest 10,000 or 1,000.

group.”

- 5–7 minutes: independent work time
- 5 minutes: group discussion
- Monitor for students who agree with different characters because they round the altitudes to different place value units.

Synthesis

- Select previously identified students to share their responses and reasoning.

Lesson Synthesis

🕒 10 min

“Today we used rounding to make sense of situations and solve problems. We saw that in real-life situations, different ways of rounding may lead us to different conclusions, and some ways of rounding may be more useful than others.”

Display the table showing airplane altitudes.

“We learned that rounding to the nearest 1,000 was not the best idea for determining if planes are a safe distance apart. When might it be helpful to round numbers like these altitudes, then?” (Sample response: When we want to know approximately where the planes are, which ones are the highest and the lowest in the air, or which planes are higher than another plane.)

“In what situations have you rounded multi-digit numbers to make it easier to do or understand something? Could you give some examples of how you might round the numbers?” (Describing the number of people at an event like in a baseball stadium.)

Suggested Centers

- Mystery Number (1–4), Stage 5: Six-digit Numbers (Addressing)
- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Supporting)

Student Section Summary

In this section, we learned to compare, order, and round numbers up to 1,000,000.

We started by using what we know about place value to compare large whole numbers. For instance,

we know that 45,892 is less than 407,892 because the 4 in 45,892 represents four ten-thousands and the 4 in 407,892 represents four hundred-thousands.

Next, we found multiples of 1,000, 10,000, and 100,000 that are closest to given numbers—at first with the help of number lines, and later without. For example, for 407,892, we know that:

- 408,000 is the nearest multiple of 1,000
- 410,000 is the nearest multiple of 10,000
- 400,000 is the nearest multiple of 100,000

Finally, we used what we know about finding nearest multiples to round large numbers to the nearest thousand, ten-thousand, and hundred-thousand.

Complete Cool-Down

Response to Student Thinking

Students do not incorporate rounding to explain how close the planes are or how both Jada and Noah could be correct.

Next Day Support

- Add this cool-down to the first activity to review. Consider asking students to round the altitudes of planes C and E (or A and B) to the nearest hundred, thousand, and ten-thousand, and discuss how the rounded numbers could affect our understanding of the situation.

Section D: Add and Subtract

Lesson 18: Standard Algorithm to Add and Subtract

Standards Alignments

Addressing 4.NBT.B.4

Teacher-facing Learning Goals

- Add multi-digit numbers, with composing, using the standard algorithm.
- Subtract multi-digit numbers, without decomposing, using the standard algorithm.

Student-facing Learning Goals

- Let's find sums and differences of large numbers.

Lesson Purpose

The purpose of this lesson is to add and subtract large numbers within 100,000 using the standard algorithm.

In grade 3, students found sums and differences within 1,000. Students analyzed and used different algorithms based on place value, including the standard algorithm. As students work with larger numbers in grade 4, they recognize that the standard algorithm is a reliable and efficient way to add and subtract within 1,000,000.

Grid paper should be made available but not required, as a tool to support aligning digits when adding and subtracting in each activity.

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR2 (Activity 1)

Instructional Routines

Estimation Exploration (Warm-up)

Materials to Gather

- Grid paper: Activity 1, Activity 2

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

What strategies from earlier grades did students rely on to find sums and differences in the warm-up and first activity, before the standard algorithm was explicitly mentioned? How can you support students in connecting these strategies to the standard algorithm?

Cool-down (to be completed at the end of the lesson)

 5 min

Andre's Steps

Standards Alignments

Addressing 4.NBT.B.4

Student-facing Task Statement

Andre started tracking his steps. He walked 14,687 steps on Monday and 10,512 steps on Tuesday.

1. How many steps did he walk in those two days? Show your reasoning.
2. How many more steps did he walk on Monday than on Tuesday?

Student Responses

1. 25,199 steps. Sample response:

$$\begin{array}{r}
 14,687 \\
 + 10,512 \\
 \hline
 25,199
 \end{array}$$

2. 4,175 steps. Sample response:

$$\begin{array}{r} 14,687 \\ - 10,512 \\ \hline 4,175 \end{array}$$

Begin Lesson

Warm-up

🕒 10 min

Estimation Exploration: What's the Difference?

Standards Alignments

Addressing 4.NBT.B.4

The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information.

The expression allows students to preview the work of this lesson and give teachers insight into how students think about subtraction.

Instructional Routines

Estimation Exploration

Student-facing Task Statement

Estimate the difference: $42,050 - 3,790$.

Record an estimate that is:

too low	about right	too high

Student Responses

Sample response:

Launch

- Groups of 2
- Display the expression.
- "What is an estimate that's too high?" "Too low?" "About right?"
- 1 minute: quiet think time

Activity

- "Discuss your thinking with your partner."

- Too low: 35,000
- Too high: 40,000
- About right: 38,000

- 1 minute: partner discussion
- Record responses.

Synthesis

- “Is anyone’s estimate less than 30,000?”
- “Is anyone’s estimate greater than 40,000?”
- “Based on this discussion, does anyone want to revise their estimate?”
- “Let’s find out how to add and subtract numbers like these.”

Activity 1

 15 min

Weekly Steps

Standards Alignments

Addressing 4.NBT.B.4

The purpose of this activity is for students to add and subtract numbers through the thousands place in a way that makes sense to them. The numbers here do not require regrouping when subtracting. Throughout the activity, teachers have the opportunity to learn what students know about addition and subtraction through the hundreds place and how they apply that prior knowledge to work with four-digit numbers. Working with larger numbers sets the stage for students to think about the standard algorithm as an efficient way to add and subtract.

Students may need an orientation to the context. To give students an idea of what the number of steps means, share that it takes about 1,700 steps to walk a mile.

Access for English Learners

MLR2 Collect and Display. Circulate, listen for, and collect the language students use as they compare the amount of steps. On a visible display, record words and phrases such as: “most,” “least,” “add,” “subtract,” “difference,” “total.” Invite students to borrow language from the display as needed, and update it throughout the lesson.

Advances: Conversing, Reading

Access for Students with Disabilities

Representation: Access for Perception. Provide access to materials that students may find helpful for addition and subtraction with large numbers, such as base-ten blocks. During the synthesis, ask students to identify correspondences between the more concrete and more abstract representations that they share.

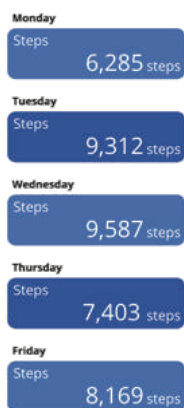
Supports accessibility for: Conceptual Processing, Memory

Materials to Gather

Grid paper

Student-facing Task Statement

A teacher uses an app on her cell phone to track her physical activity. Here is the data on the number of steps over 5 school days.



For each question, show your reasoning.

1. On which two days did she take the most steps? Over those two days, how many steps did she take altogether?
2. What is the difference in the number of steps she took on her most active day and on her least active day?
3. Between Wednesday and Thursday, her activity level dropped. How many fewer steps did she take on Thursday than Wednesday?

Student Responses

1. Tuesday and Wednesday.
 $9,587 + 9,312 = 18,899$
2. $9,587 - 6,285 = 3,302$
3. $9,587 - 7,403 = 2,184$

Launch

- Groups of 2
- Display the image in the task.
- “What do you notice? What do you wonder?”
- “Based on the data, when was the teacher most active that week? Least active?”

Activity

- 5 minutes: independent work time
- 3 minutes: partner work time

Synthesis

- Ask students to share responses and strategies for finding sums and differences. Record strategies.
- “Were there certain strategies that showed up a lot in this activity? Can we describe them?” (Yes, a lot of us added and subtracted by place value.)

Advancing Student Thinking

If students consider the one-digit sums and lose track of the place value each digit represents, consider asking: “How might writing each number in expanded form help you keep track of the values?” Offer students grid paper to support them in aligning the digits by place value.

Activity 2

🕒 20 min

Steps During the Weekend

Standards Alignments

Addressing 4.NBT.B.4

The purpose of this activity is for students to analyze strategies for adding and subtracting numbers to the ten-thousands place. Students look at addition problems that require composing new units, when the sum of the digits in a particular place value exceeds 10. The subtraction problems do not require students to decompose a unit, as this will be addressed in future lessons. They look at 2 strategies.

Strategy A allows students to add each number in terms of the value of each digit, written in expanded form. Strategy B follows the same logic, but without writing the full value that each digit represents. Then, students use the same strategies to subtract without decomposing a unit.

When students perform operations on the quantities in the situation, they reason abstractly and quantitatively (MP2).

Materials to Gather

Grid paper

Student-facing Task Statement

The teacher also keeps track of the number of steps she took during the weekend. The data from Saturday and Sunday of that same week are shown.



Launch

- Groups of 2
- “Now let’s look at the weekend activity,”
- Display the image in the task.
- “What do you notice about the number of steps the teacher took during the week

Here are two strategies to compute the total number of steps she took over the weekend.

Strategy A

$$\begin{array}{r} 10,000 + 7,000 + 300 + 70 + 5 \\ + 10,000 + 4,000 + 0 + 20 + 4 \\ \hline 20,000 + 11,000 + 300 + 90 + 9 = 31,399 \end{array}$$

Strategy B

$$\begin{array}{r} 1 \\ 1 \ 7, \ 3 \ 7 \ 5 \\ + 1 \ 4, \ 0 \ 2 \ 4 \\ \hline 3 \ 1, \ 3 \ 9 \ 9 \end{array}$$

- Analyze the strategies. Discuss with your partner:
 - What is happening in each strategy?
 - How are they alike? How are they different?
- Use both strategies to find the difference between the number of steps the teacher took on Saturday and on Sunday.
- During another week, the teacher took 26,815 steps during the weekdays and 11,403 steps during the weekend. Use both strategies to find the total number of steps she took that week.

Student Responses

- Sample response: In both strategies, the original numbers are lined up vertically. In strategy A, the numbers are written in expanded form before they were added. Then the sums from different place values are added. In strategy B, the numbers in each place value are added directly.
- Strategy A

$$\begin{array}{r} 10,000 + 7,000 + 300 + 70 + 5 \\ - 10,000 + 4,000 + 0 + 20 + 4 \\ \hline 0 + 3,000 + 300 + 50 + 1 = 3,351 \end{array}$$

Strategy B

versus on the weekend?" (The teacher took a lot more steps each day during the weekend.)

Activity

- 2 minutes: quiet think time
- 6–7 minutes: partner work time

Synthesis

- Ask students to explain how the strategies are alike and how they are different. (They both add by place value and get the same answer, but one strategy breaks each number up and the other does not.)
- "Why might a student have used one of the strategies instead of the other?"
- "Strategy B is called the **standard algorithm** and is useful when we add and subtract large numbers."

$$\begin{array}{r} 17,375 \\ - 14,024 \\ \hline 3,351 \end{array}$$

3. Strategy A

$$\begin{array}{r} 20,000 + 6,000 + 800 + 10 + 5 \\ + 10,000 + 1,000 + 400 + 0 + 3 \\ \hline 30,000 + 7,000 + 1,200 + 10 + 8 = 38,218 \end{array}$$

Strategy B

$$\begin{array}{r} 1 \\ 26,815 \\ + 11,403 \\ \hline 38,218 \end{array}$$

Advancing Student Thinking

Students may accurately write numbers in expanded form to subtract, but add the values instead of subtracting them because of the addition symbols they see. Consider refocusing students to the original problem and asking: “How might you find the difference between the values in each place?”

Lesson Synthesis

 10 min

Display $43,975 + 2,140 = 65,375$.

“How can you tell this equation is false without finding the sum?” (You start with 43 thousands and add 2 thousands so you can’t have 65 thousands.)

“What mistake do you think a student made to get this sum?” (It looks like they added the 2,000 like it was 20,000 because they didn’t pay attention to the value of each digit.)

“How could using the standard algorithm help this student?” (If they lined up the numbers by place, it would be easier to add.)

Suggested Centers

- Tic Tac Round (3–5), Stage 2: Any Place (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 6: Beyond 1,000 (Addressing)

Complete Cool-Down

Response to Student Thinking

Students misalign digits when adding or subtracting multi-digit numbers.

The work in this lesson builds from addition concepts developed in a prior unit.

Next Day Support

- During the launch of the first activity in the next lesson, remind students about available grid paper for the lesson.

Prior Unit Support

Grade 3, Unit 3, Section A: Add Within 1,000

Lesson 19: Compose and Decompose to Add and Subtract

Standards Alignments

Addressing 4.NBT.B.4, 4.NF.B.3.c

Teacher-facing Learning Goals

- Add and subtract multi-digit numbers, with composing or decomposing, using the standard algorithm.

Student-facing Learning Goals

- Let's compose and decompose units to add and subtract.

Lesson Purpose

The purpose of this lesson is for students to review how to add and subtract multi-digit numbers with composition and decomposition.

In earlier grades, students encountered subtraction problems which required decomposing a unit. In this lesson, students review this idea of decomposition and revisit how it is recorded when using the standard algorithm to subtract numbers through the thousands place. Students also use composition to add multi-digit numbers through the hundred-thousands place.

Access for:

Students with Disabilities

- Representation (Activity 2)

Instructional Routines

MLR7 Compare and Connect (Activity 2), Number Talk (Warm-up)

Materials to Gather

- Grid paper: Activity 1

Lesson Timeline

Warm-up

10 min

Teacher Reflection Question

Who got to do math today in class? How do you know? What norms or routines allowed those

Activity 1	15 min	students to engage? How can you adjust these norms and routines so all students do math tomorrow?
Activity 2	20 min	
Lesson Synthesis	10 min	
Cool-down	5 min	

Cool-down (to be completed at the end of the lesson)

 5 min

Difference and then Sum

Standards Alignments

Addressing 4.NBT.B.4

Student-facing Task Statement

1. Use the standard algorithm to find the difference.

a. $1,993 - 118$

b. $1,897 - 116$

2. Find the value of the sum.

$$\begin{array}{r}
 827,499 \\
 + 80,125 \\
 \hline
 \end{array}$$

Student Responses

1. a. 1,875

b. 1,781

2. 907,624

----- Begin Lesson -----

Warm-up

 10 min

Number Talk: Subtract Fractions

Standards Alignments

Addressing 4.NF.B.3.c

The purpose of this Number Talk is to elicit strategies and understandings students have for subtracting fractions and mixed numbers, particularly cases where it is necessary to rewrite a whole number as a fraction, or decompose it into a different whole number and fraction, in order to perform subtraction. These understandings will be helpful later in this lesson when students subtract multi-digit numbers that involve decomposing units.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $2\frac{3}{4} - 1\frac{1}{4}$
- $1\frac{1}{4} - \frac{3}{4}$
- $5\frac{1}{8} - 2\frac{3}{8}$
- $3\frac{2}{10} - 2\frac{7}{10}$

Student Responses

- $1\frac{2}{4}$ or $1\frac{1}{2}$: I subtract the whole numbers and then subtract the fractions.
- $\frac{2}{4}$ or $\frac{1}{2}$: I take $\frac{3}{4}$ from 1 or $\frac{4}{4}$, and then add $\frac{1}{4} + \frac{1}{4}$
- $2\frac{6}{8}$ or $2\frac{3}{4}$: I subtract the whole numbers to get $3\frac{1}{8} - \frac{3}{8}$. Then, I rewrite $3\frac{1}{8}$ as $2 + \frac{9}{8}$, and then subtract $\frac{3}{8}$
- $\frac{5}{10}$ or $\frac{1}{2}$: I subtract the whole numbers to get $1\frac{2}{10} - \frac{7}{10}$. Then I rewrite it as $\frac{12}{10} - \frac{7}{10}$.

Launch

- Display one expression.
- "Give me a signal when you have an answer and can explain how you got it."

Activity

- 1 minute: quiet think time
- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

Synthesis

- Highlight strategies in which students decomposed the first mixed number in each expression.
- Consider asking:
 - "Who can restate _____'s reasoning in a different way?"
 - "Did anyone have the same strategy but would explain it differently?"
 - "Did anyone approach the expression in a different way?"
 - "Does anyone want to add on to ___'s strategy?"

Activity 1

 15 min

Find and Check Sums

Standards Alignments

Addressing 4.NBT.B.4

The purpose of this activity is to use the standard algorithm to add multi-digit numbers, taking care to compose a new unit and record it accurately. They also analyze common errors and critique the given reasoning when composing a new unit (MP3).

Materials to Gather

Grid paper

Student-facing Task Statement

- Find the value of each sum.

<p>a</p> $\begin{array}{r} 8,299 \\ + \quad 1 \\ \hline \end{array}$	<p>b</p> $\begin{array}{r} 8,299 \\ + \quad 11 \\ \hline \end{array}$
<p>c</p> $\begin{array}{r} 8,299 \\ + \quad 111 \\ \hline \end{array}$	<p>d</p> $\begin{array}{r} 8,299 \\ + \quad 1,111 \\ \hline \end{array}$

- Use the expanded form of both 8,299 and 1,111 to check the value you found for the last sum.
- Each computation shown has at least one error. Find the errors and show the correct calculation.

<p>a</p> $\begin{array}{r} 1 \\ 1,2309 \\ + \quad 4,567 \\ \hline 16,866 \end{array}$	<p>b</p> $\begin{array}{r} 111 \\ 3,2216 \\ + \quad 789 \\ \hline 33,995 \end{array}$
--	--

Launch

- Groups of 2
- “Complete the first 2 problem and then talk to your partner about any patterns you notice.”

Activity

- 3 minutes: independent work time
- 2 minutes: partner discussion
- Share and record responses.
- If needed, use the expanded form to help students make connections between the way composing a larger unit is recorded when using the standard algorithm and what is happening in each place. In the bottom line of the example here, we see 10 in the ones place and 100 in the tens place. Both partial sums do not match the assigned values of their places.

c

$$\begin{array}{r}
 \\
 \\
 + \\
 \hline
 6
 \end{array}$$

d

$$\begin{array}{r}
 \\
 \\
 + \\
 \hline
 2
 \end{array}$$

Student Responses

- 8,300
 - 8,310
 - 8,410
 - 9,410
- Expanded form:

$$\begin{array}{r}
 8,000 + 200 + 90 + 9 \\
 + 1,000 + 100 + 10 + 1 \\
 \hline
 9,000 + 300 + 100 + 10
 \end{array}$$

- Sample response:
 - In the ones place, 9 plus 7 is 16, so 1 ten should be added into the tens place. The correct sum is 16,876.
 - The 1 ten that came from adding ones and the 1 hundred that came from adding tens are shown but not added. The correct sum is 33,005.
 - The sum of ones, tens, and hundreds each results in 1 larger unit being composed but they are not shown. The correct sum is 691,110.
 - The 1 ten-thousand that is composed from adding thousands didn't get added even though it is shown. The correct answer is 28,998.

thousands	+	hundreds	+	tens	+	ones
8,000	+	200	+	90	+	9
+ 1,000	+	+ 100	+	+ 10	+	+ 1
9,000	+	+ 300	+	+ 100	+	+ 10

- 3–4 minutes: independent work time for the last problem.

Synthesis

- Ask students to share the errors they identified in the last set of questions.
- “What are some common errors when adding large numbers?”

Advancing Student Thinking

Students may need support identifying errors in the last problem. Consider asking: “How might subtraction be used to help identify the error?”

Activity 2

🕒 20 min

Priya's Family Heirlooms

Standards Alignments

Addressing 4.NBT.B.4

This activity revisits the idea of decomposing a unit in one place into 10 units of the place value to its right when subtracting multi-digit numbers using the standard algorithm. Students recall how this is done as they subtract numbers in which decomposition is necessary.

To support students with understanding the context, the activity launch introduces a saree (traditional wedding attire for women in India) and the idea of family heirlooms, or gifts passed down from generation to generation.

When students create a subtraction problem that does not require decomposition of a unit when using the standard algorithm, they make use of structure and their understanding of subtraction as they choose the digits for the numbers in their difference (MP7).

This activity uses *MLR7 Compare and Connect*. Advances: representing, conversing

🕒 Access for Students with Disabilities

Representation: Develop Language and Symbols. Activate or supply background knowledge. To help students recall the term decompose, represent a four-digit number (for example 2,467) with both base-ten blocks and digits in a place value chart. Ask, “what does it mean to decompose a unit?” Show an example of decomposition, such as exchanging one long rectangle for ten small cubes. Notate this in the place value chart by crossing out the 6 and 7, and writing 5 and 17 above them. Reset the place value blocks and show additional examples as needed.

Supports accessibility for: Conceptual Processing, Memory, Language

Instructional Routines

MLR7 Compare and Connect

Student-facing Task Statement

Launch

- Groups of 2
- “What do you notice and wonder about these pictures?”



Priya's mom wore an heirloom bracelet at her wedding in 1996. The bracelet was made in 1947.

$$\begin{array}{r} 8 \ 16 \\ 1, \ 9 \ \cancel{9} \ \cancel{6} \\ - \ 1, \ 9 \ 4 \ 7 \\ \hline 4 \ 9 \end{array}$$

Priya subtracted to find out how old the bracelet was when her parents were married.

Priya learned that her grandmother had also worn the bracelet at her wedding 24 years earlier.

$$\begin{array}{r} 1, \ 9 \ 9 \ 6 \\ - \quad \quad 2 \ 4 \\ \hline 1, \ 9 \ 7 \ 2 \end{array}$$

Priya subtracted to find out when her grandparents were married.

- Are both calculations correct? Why does one calculation have some numbers crossed out and some new numbers, but the other one does not? Explain your reasoning.
- Priya's grandmother wore an heirloom necklace and earring set that was 63 years old when she was married in 1972.
 - If Priya uses the standard algorithm to subtract $1972 - 63$ will she need to decompose a unit? Explain your reasoning.
 - Use the standard algorithm to subtract $1972 - 63$ and find the year the necklace was made.
- Create a subtraction problem that would not require decomposing a unit to subtract. Then solve the problem.



- Collect student ideas.
- "In this activity, Priya is researching her family history. Let's see what she discovers."
- "The women in the picture are dressed in a traditional Indian garment called a 'saree'. Sarees are made of colorful fabric and often have intricate embroidery or patterned print designs."
- "The bracelets in the picture are also from India. Sometimes jewelry like this is used as heirlooms, or gifts that are passed down from one generation to the next."

Activity

- Groups of 2
- 5–6 minutes: independent work time
- 3 minutes: partner work time
- As students work, listen for student discourse that includes language about the place value of the digits and when to decompose a unit.

Synthesis

MLR7 Compare and Connect

- "Let's do a gallery walk to see what problems you created."
- "As you walk, discuss with a partner what you notice about the value of the digits in the numbers that were chosen."
- 3 minutes: gallery walk
- Collect 1–2 responses from student discussions during the gallery walk.
- Share 1–2 of the responses you collected.
- 1 minute: partner discussion
- "What is the same about each of the problems you created?" (In each problem each digit is greater in the first number than in the second number)

	,			

Student Responses

1. Both calculations are correct. One has numbers crossed out because we subtracted more than 6 ones and we needed to decompose a ten to be able to subtract more.
2.
 - a. Yes. Sample response: Priya will need to decompose a ten. Using the standard algorithm, she will need more ones to subtract from since there are 2 ones in the first number, and she is subtracting 3 ones. If she decomposes the 70 into 60 + 12, she can subtract 3 ones from 12 ones.
 - b. The necklace was made in 1909.
3. Sample response: $1,698 - 457 = 1,241$

- 2 minutes: whole-group discussion

Advancing Student Thinking

Students may not remember when to decompose a unit or how to record regrouping. Urge students to begin to subtract by place value, either by using expanded form or lining up the digits. Ask: “What issue comes up when you subtract the ones in $1972 - 63$?” Allow students to explain that they don’t have enough ones in the ones place to subtract 3, but they can decompose a ten to get 10 ones and add it to the 2 already there. Then consider asking:

- “How will you record all of the ones you have after you decompose a ten?”
- “How will you know if you need to decompose a unit when subtracting one number from another?”

Lesson Synthesis

🕒 10 min

Write $1972 - 63$ for all students to see.

“When we look at a problem, how do we know if we will need to decompose a unit?” (If the digit we are subtracting is larger than the digit we are subtracting from, we will need to decompose a unit and regroup.)

Display for all to see:

$$\begin{array}{r} 8, 2 9 9 \\ + 1, 1 1 1 \\ \hline \end{array}$$

“When we look at an addition problem, how do we know when we will need to compose a new unit?” (If the sum of the digits in one place is greater than 9, we will compose a new unit, and record 1 more for the place to the left.)

Suggested Centers

- Tic Tac Round (3–5), Stage 2: Any Place (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 6: Beyond 1,000 (Addressing)

Complete Cool-Down

Response to Student Thinking

Students subtract the smaller number from the larger number regardless of placement in each number. They do not decompose units when needed, resulting in calculation errors.

The work in this lesson builds from subtraction concepts developed in a prior unit.

Next Day Support

- Launch Activity 1 with a discussion about organizing digits.

Prior Unit Support

Grade 3, Unit 3, Section B: Subtract Within 1,000

Lesson 20: Add and Subtract Within 1,000,000

Standards Alignments

Addressing 4.NBT.B.4

Teacher-facing Learning Goals

- Add and subtract multi-digit numbers, with multiple compositions or decompositions, using the standard algorithm.

Student-facing Learning Goals

Let's use the standard algorithm to add and subtract.

Lesson Purpose

The purpose of this lesson is for students to add and subtract within 1,000,000 with multiple compositions or decompositions.

In this lesson, students use the standard algorithm for addition and subtraction to the hundred-thousands place. They build their fluency with the algorithm as they encounter examples where more than one digit has to be decomposed in order to subtract. Students also look at errors that are commonly made when using the algorithm to find sums and differences.

Access for:

Students with Disabilities

- Action and Expression (Activity 1)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Notice and Wonder (Warm-up)

Materials to Gather

- Grid paper: Activity 1, Activity 2

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min

Teacher Reflection Question

What connections did students make between the decomposition of base-ten units using expanded form and using the standard algorithm when subtracting large numbers?

Lesson Synthesis 10 min

Cool-down 5 min

Cool-down (to be completed at the end of the lesson)

🕒 5 min

Subtract

Standards Alignments

Addressing 4.NBT.B.4

Student-facing Task Statement

Use the standard algorithm to find the value of the difference.

$$\begin{array}{r} 173,225 \\ - 114,329 \\ \hline \end{array}$$

Student Responses

58,896

$$\begin{array}{r} , \\ \\ 1 , \\ - 114,329 \\ \hline 58,896 \end{array}$$

----- **Begin Lesson** -----**Warm-up**

🕒 10 min

Notice and Wonder: Subtracting Tens of Thousands

Standards Alignments

Addressing 4.NBT.B.4

This warm-up prompts students to analyze an example of subtraction using both the standard algorithm and expanded form. The numbers require decomposing multiple units, which are shown in both strategies. The observations here prepare students to later reason with similar subtraction problems in which more than one decomposition is needed.

Instructional Routines

Notice and Wonder

Student-facing Task Statement

What do you notice? What do you wonder?

A	B
$\begin{array}{r} 13 \\ 8 \\ 75, \cancel{9} \cancel{4} \cancel{0} \\ - 12,786 \\ \hline \end{array}$	$\begin{array}{r} 130 \\ 800 \\ 70,000 + 5,000 + \cancel{900} + \cancel{40} + \cancel{0} \\ - 10,000 + 2,000 + 700 + 80 + 6 \\ \hline 60,000 + 3,000 + 100 + 50 + 4 \end{array}$

Student Responses

Students may notice:

- One calculation uses the standard algorithm and the other uses expanded form.
- In Problem A, the 9, 4, and 0 in 75,940 are crossed out. In Problem B, 900, 40, and 0 are crossed out.
- The tens place has 2 new numbers at the top. There are 3 different units being decomposed.
- The result of the subtraction is not shown in the first example, but it is shown in the second example.

Students may wonder:

- Why are there multiple numbers above the two numbers being subtracted?
- Why is the difference not shown in the first example?

Launch

- Groups of 2
- Display subtraction calculations.
- “What do you notice? What do you wonder?”
- 1 minute: quiet think time

Activity

- “Discuss your thinking with your partner.”
- 1 minute: partner discussion
- Share and record responses.

Synthesis

- “How are the two examples alike? How are they different?” (In the second one the numbers are written in expanded form, including the numbers that show regrouping.)
- “We’ve seen subtraction problems with decomposed units before. How are these different?” (In the problems we have seen so far, only one place needed to be decomposed in order to subtract. In these examples, more than one place needs to be decomposed.)

- Would the first example also get a difference of 63,154?

Activity 1

🕒 15 min

Add and Subtract Large Numbers

👤 ↔ 👤 PLC Activity

Standards Alignments

Addressing 4.NBT.B.4

The purpose of this activity is for students to add and subtract multi-digit numbers through the hundred-thousands place. To find the value of some differences, students will decompose more than one unit.

The last question includes problems with a missing addend and a missing subtrahend. Besides making use of the structure of the standard algorithm (MP7), students will need to rely on what they know about the relationship between addition and subtraction to find the missing numbers.

🕒 Access for Students with Disabilities

Action and Expression: Develop Expression and Communication. Develop fluency with the standard algorithm by offering and gradually releasing scaffolds. Some students may continue to benefit from access to tools such as base-ten blocks, a blank place value chart, and place value cards. Use place value language to make explicit connections between these representations and the standard algorithm. Invite students to record what they are doing with these tools using the notation of the standard algorithm.

Supports accessibility for: Conceptual Processing, Language, Memory

Materials to Gather

Grid paper

Student-facing Task Statement

1. Use the standard algorithm to find the value of each sum and difference. If you get stuck, try writing the numbers in expanded form.
 - a. $7,106 + 2,835$

Launch

- Groups of 2
- Give students access to grid paper.

- b. $8,179 - 3,599$
 c. $142,571 + 10,909$
 d. $268,322 - 72,145$

2. Find the missing number that would make each computation true.

a	b
$\begin{array}{r} 67,182 \\ + \\ \hline 129,400 \end{array}$	$\begin{array}{r} 234,650 \\ - \\ \hline 193,710 \end{array}$

Student Responses

1. a. 9,941
 b. 4,580
 c. 153,480
 d. 196,177
2. a. 62,218
 b. 40,940

Activity

- 5–7 minutes: independent work time
- “Check your responses to the first problem with your partner and make any adjustments you need to make. Then work on the second problem together.”
- 2–3 minutes: partner discussion
- As students work on the second problem monitor for students who:
 - Find the missing addend by adding up from 67,182 to 129,400, or by subtracting $129,400 - 67,182$.
 - Find the missing subtrahend by adding up from 193,710 to 234,650, or by subtracting $234,650 - 193,710$

Synthesis

- “How can you tell if your answers are correct? How can you check them?” (One way to check the result of subtraction is by adding it back to the number being subtracted. One way to check the result of addition is by subtracting one addend from the sum. Another way of checking is by performing the calculations with the numbers written in expanded form.)

Advancing Student Thinking

Students may not recognize the relationship between addition and subtraction, or may not know how to begin the problem involving a missing addend and missing subtrahend. Consider asking: “How might we write this problem as an equation with a symbol for the unknown?”

Activity 2

Spot Errors

 20 min

Standards Alignments

Addressing 4.NBT.B.4

In this activity, students analyze addition and subtraction calculations, identify errors, and explain what makes certain ways of calculating problematic. The work here gives students opportunities to construct logical arguments and critique the reasoning of others (MP3).

Access for English Learners

MLR8 Discussion Supports. During group work, invite students to take turns sharing their responses. Ask students to restate what they heard using precise mathematical language and their own words. Display the sentence frame: “I heard you say” Original speakers can agree or clarify for their partner.

Advances: Listening, Speaking

Materials to Gather

Grid paper

Student-facing Task Statement

- Kiran is trying to find the sum of 204,500 and 695. He isn’t sure how to set up the calculation so he wrote down two ideas. Which way is correct? Be ready to share your thinking with your partner.

A

$$\begin{array}{r} 20,450 \\ + 695 \\ \hline 89,950 \end{array}$$

B

$$\begin{array}{r} 204,500 \\ + 695 \\ \hline 205,195 \end{array}$$

- Lin made some errors when subtracting 4,325 from 61,870. Identify as many errors as you can find. Then, show the correct way to subtract.

Launch

- Groups of 2
- Display the first problem.
- 2 minutes: quiet think time
- 2–3 minutes: partner discussion

Activity

- 5 minutes: independent work time to complete the second problem.
- 2 minutes: partner discussion
- Monitor for students who describe the errors using place value language and an understanding of how and when to decompose a unit.

Synthesis

- Select 2–3 students to share their responses and reasoning.

Lesson Synthesis

 10 min

Display these subtraction problems.

A

$$\begin{array}{r} 187,654 \\ - \quad 44,444 \\ \hline \end{array}$$

B

$$\begin{array}{r} 187,654 \\ - \quad 88,888 \\ \hline \end{array}$$

Ask students to decide if they agree with the following statements, without doing any calculations. Students should be prepared to defend their decisions.

- “Only problem A can be done. Problem B cannot be completed because the 8s in the second number are greater than most digits in the first number.” (Disagree)
- “Problem A doesn’t require any decomposing.” (Agree)
- “Problem B requires decomposing units in four places.” (Disagree)
- “The result of the subtraction in A is in the hundred-thousands.” (Agree)
- “The result of the subtraction in B is also in the hundred-thousands” (Disagree)

If time permits, ask students to find each difference (Problem A is 143,210, and Problem B is 98,766) and to show a way to check their answers.

Suggested Centers

- Tic Tac Round (3–5), Stage 2: Any Place (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 6: Beyond 1,000 (Addressing)

Complete Cool-Down

Response to Student Thinking

Students only decompose one time or lose track of notation when regrouping several times.

Next Day Support

- Launch Activity 1 by highlighting important notation from previous lessons.

Lesson 21: Zeros in the Standard Algorithm

Standards Alignments

Addressing 4.NBT.A.2, 4.NBT.B.4

Teacher-facing Learning Goals

- Use the standard algorithm to subtract in the ten-thousands when the minuend has several zeros.

Student-facing Learning Goals

- Let's subtract from numbers with several zeros.

Lesson Purpose

The purpose of this lesson is to use the standard algorithm when the minuend has several zeros.

These problems can be challenging for students because they require special attention to make sense of how the multiple regroupings work and how they are recorded in the standard algorithm.

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR8 (Activity 1)

Instructional Routines

Which One Doesn't Belong? (Warm-up)

Materials to Gather

- Grid paper: Activity 2

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

Which parts of this lesson gave you insight into how students are subtracting across zero? What insights did you gain?

Cool-down (to be completed at the end of the lesson)

⌚ 5 min

Finding Differences

Standards Alignments

Addressing 4.NBT.B.4

Student-facing Task Statement

Use the standard algorithm to find each difference.

$$\begin{array}{r} 6,004 \\ - \quad 842 \\ \hline \end{array}$$

$$\begin{array}{r} 9,090 \\ - \quad 5,819 \\ \hline \end{array}$$

Student Responses

$$\begin{array}{r} 9 \\ 5 \cancel{10} \cancel{10} \\ \cancel{6,} \cancel{0} \cancel{0} 4 \\ - \quad 842 \\ \hline 5,162 \end{array}$$

$$\begin{array}{r} 9 \\ 8 \cancel{10} \cancel{8} \cancel{10} \cancel{10} \\ \cancel{9} \cancel{0,} \cancel{9} \cancel{0} \cancel{0} \\ - \quad 5,819 \\ \hline 8,5081 \end{array}$$

----- Begin Lesson -----

Warm-up

⌚ 10 min

Which One Doesn't Belong: Numbers with 0, 2, and 5

Standards Alignments

Addressing 4.NBT.A.2

This warm-up prompts students to carefully analyze and compare features of multi-digit numbers. In

making comparisons, students have a reason to use language precisely (MP6), especially place value names. The activity also enables the teacher to hear how students talk about the meanings of non-zero digits in different places of a multi-digit number.

Students observations will support their reasoning in the next activity when they subtract a number with non-zero digits from the four numbers listed.

Instructional Routines

Which One Doesn't Belong?

Student-facing Task Statement

Which one doesn't belong?

- A. 2,050
- B. 2,055
- C. 205.2
- D. 20,005

Student Responses

Sample responses:

- 2,050 is the only one without a 5 in the ones place.
- 2,055 is the only one that doesn't have just one 5.
- 205.2 is the only one that is not a whole number.
- 20,005 is the only number which is not a four-digit number.

Launch

- Groups of 2
- Display numbers.
- "Pick one that doesn't belong. Be ready to share why it doesn't belong."
- 1 minute: quiet think time

Activity

- "Discuss your thinking with your partner."
- 2–3 minutes: partner discussion
- Share and record responses.

Synthesis

- "What if we subtracted 44 from each whole number?" Record "- 44" under each whole number.
- "Which number would it be easiest to subtract 44?" (2,055 – 44 because you don't have to decompose units.)
- "How could we subtract 44 from the other whole numbers?" (We would have to decompose other place values.)

Activity 1

🕒 20 min

What If There is Nothing to Decompose?

Standards Alignments

Addressing 4.NBT.B.4

The purpose of this activity is to examine subtraction cases in which non-zero digits are subtracted from zero digits. In some cases, students could simply look at the digit to the left of a 0 and decompose 1 unit of that number. But in other cases, the digit to the left is another 0 (or more than one 0), which means looking further to the left until reaching a non-zero digit. Students learn to decompose that unit first, and then move to the right, decomposing units of smaller place values until reaching the original digits being subtracted. The problems are sequenced from fewer zeros to more zeros to allow students to see how to successively decompose units.

Recording all of the decompositions can be challenging. For the last problem, two sample responses are given to show two different ways of recording the decompositions. The important point to understand is that because there are no tens, hundreds, or thousands to decompose, a ten-thousand must be decomposed to make 10 thousands. Then, one of the thousands is decomposed to make 10 hundreds, and so on, until reaching the ones place. Those successive decompositions can be lined up horizontally, but this can make it hard to see what happened first. A second way shows more clearly the order in which the decompositions happen, but it may be challenging to see which place the successive decomposed units are in.

To add movement to this activity, the second problem could be done as a gallery walk where each group completes one problem and then walk around the room to look for similarities and differences in others' posters.

Access for English Learners

MLR8 Discussion Supports. Display sentence frames to support partner discussion: "I noticed ____ so I . . .", and "I wonder if . . ."

Advances: Conversing, Representing

Access for Students with Disabilities

Representation: Develop Language and Symbols. Maintain a visible display to record language that students can use to explain their work. Include important vocabulary, such as the name of each place value category, decompose, and exchange. Also include sentence frames, such as: "I looked at the ____ place and saw that I did not have enough ____ to subtract." and "I exchanged one ____ for 10 ____."

Supports accessibility for: Conceptual Processing, Language, Organization

$$\begin{array}{r}
 9 \ 9 \\
 1 \ 10 \ 10 \ 15 \\
 \cancel{2} \ \cancel{0} \ \cancel{0} \ \cancel{5} \\
 - \quad 1, \ 4 \ 3 \ 6 \\
 \hline
 5 \ 6 \ 9
 \end{array}
 \qquad
 \begin{array}{r}
 9 \ 9 \ 9 \\
 1 \ 10 \ 10 \ 10 \ 15 \\
 \cancel{2} \ \cancel{0} \ \cancel{0} \ \cancel{0} \ \cancel{5} \\
 - \quad 1, \ 4 \ 3 \ 6 \\
 \hline
 1 \ 8, \ 5 \ 6 \ 9
 \end{array}$$

3. a

$$\begin{array}{r}
 7 \ 10 \ 2 \ 10 \\
 \cancel{8} \ \cancel{0} \ \cancel{3} \ \cancel{0} \\
 - \quad 2, \ 6 \ 1 \ 5 \\
 \hline
 5, \ 4 \ 1 \ 5
 \end{array}$$

b

$$\begin{array}{r}
 7 \ 10 \ 2 \ 13 \\
 \cancel{8} \ \cancel{0} \ \cancel{3} \ \cancel{3} \\
 - \quad 2, \ 6 \ 1 \ 5 \\
 \hline
 5, \ 4 \ 1 \ 8
 \end{array}$$

c

$$\begin{array}{r}
 9 \ 9 \\
 7 \ 10 \ 10 \ 13 \\
 \cancel{8} \ \cancel{0} \ \cancel{0} \ \cancel{3} \\
 - \quad 2, \ 6 \ 1 \ 5 \\
 \hline
 5, \ 3 \ 8 \ 8
 \end{array}$$

d

$$\begin{array}{r}
 9 \ 9 \ 9 \\
 7 \ 10 \ 10 \ 10 \ 13 \\
 \cancel{8} \ \cancel{0} \ \cancel{0} \ \cancel{0} \ \cancel{3} \\
 - \quad 2, \ 6 \ 1 \ 5 \\
 \hline
 7 \ 7, \ 3 \ 8 \ 8
 \end{array}
 \qquad
 \begin{array}{r}
 9 \ 13 \\
 9 \ 10 \\
 9 \ 10 \\
 7 \ 10 \\
 \cancel{8} \ \cancel{0} \ \cancel{0} \ \cancel{0} \ \cancel{3} \\
 - \quad 2, \ 6 \ 1 \ 5 \\
 \hline
 7 \ 7, \ 3 \ 8 \ 8
 \end{array}$$

Advancing Student Thinking

Students may lose track of the units when multiple rounds of decompositions are required. Offer base-ten blocks and prompt students to show multiple decompositions when finding the value of $100 - 1$ using a large square base-ten block that represents 100. Consider asking:

- “How can you show subtraction of 1?” (Exchange it for 100 ones.)

- “What if we could only exchange 1 unit for 10 units at a time?” (Exchange the hundred for 10 tens, then exchange 1 ten for 10 ones, so that we’d have 9 tens and 10 ones. Then, we can remove 1.)
- “How would you show the subtraction of 1 from 100 using the standard algorithm?”

Activity 2

🕒 15 min

What is Your Age?

Standards Alignments

Addressing 4.NBT.B.4

In this activity, students solve contextual problems that involve subtracting numbers with non-zero digits from numbers with one or more zero digits. Students may choose other ways to find the difference (for example, adding up and using a number line to keep track), but are asked to use the standard algorithm at least once.

In the launch, students subtract their age from the current year. This provides an opportunity for students to notice the relationship between this difference and their current age (MP7).

Materials to Gather

Grid paper

Student-facing Task Statement

Jada recorded the birth year of some of her maternal grandparents for a family history project.

family member	birth year
grandmother	1952
grandfather	1948
great-grandmother	1930
great-grandfather	1926

Launch

- Groups of 2
- Give students access to grid paper.
- “Write the year that you were born down and subtract that year from the current year.”
- “Share with a neighbor what you found out.” (Students will notice that the number that results is their current age or the age they will be on their upcoming birthday.)

As of this year, what is the age of each family member? Show your reasoning. Use the standard algorithm at least once.

Student Responses

Answers vary depending on the current year. If the current year is 2021:

- Grandmother is 69 years old.
- Grandfather is 73 years old.
- Great-grandmother is 91 years old.
- Great-grandfather is 95 years old.

- “Jada used this method to find the age of some of her relatives.”

Activity

- 10 minutes: partner work time

Synthesis

- Ask students to share responses.
- “Which years did you find easiest to subtract? Which were more difficult? Why?” (Subtracting a year without decomposing any units was easier than subtracting a year that required decomposing.)
- Prompt students to check and compare ages found using the standard algorithm and those found using other ways of reasoning.

Lesson Synthesis

🕒 10 min

Display these expressions. “Here are three expressions.”

$$\begin{array}{r} 505,050 \\ - \quad 2,222 \\ \hline \end{array}$$

$$\begin{array}{r} 505,500 \\ - \quad 2,222 \\ \hline \end{array}$$

$$\begin{array}{r} 555,000 \\ - \quad 2,222 \\ \hline \end{array}$$

“How are the expressions alike?” (They all involve 2,222 that is subtracted from a six-digit number with three 5s and three 0s. Finding each difference requires multiple regroupings.)

“How are they different?” (The fives and zeros are in different positions in each number. In the first expression, only one unit needs to be decomposed before 2 ones could be subtracted from it. In the second expression, two units need to be decomposed. In the third expression, three units need to be decomposed before 2 ones could be subtracted.)

“A friend is unsure how to solve the second expression, $505,500 - 2,222$. Explain to a partner how you would use the standard algorithm to find the value of the difference.”

2 minutes: partner discussion

2 minutes: whole-group discussion

Complete Cool-Down

Response to Student Thinking

Students make errors with decomposing or notation when subtracting from numbers with more than one zero.

Next Day Support

- Launch Activity 1 by highlighting important notation from previous lessons.

Lesson 22: Solve Problems Involving Large Numbers

Standards Alignments

Building On 4.NBT.A.1, 4.NBT.A.2
Addressing 4.NBT.B.4

Teacher-facing Learning Goals

- Interpret and solve problems that involve finding sums and differences of multi-digit whole numbers.

Student-facing Learning Goals

- Let's solve problems by adding and subtracting.

Lesson Purpose

The purpose of this lesson is for students to solve problems that involve adding and subtracting multi-digit numbers.

In this lesson, students apply their skills and understandings for adding and subtracting large numbers to solve problems and participate in a game.

This lesson has a Student Section Summary.

Access for:

Students with Disabilities

- Action and Expression (Activity 2)

Instructional Routines

MLR6 Three Reads (Activity 1), True or False (Warm-up)

Materials to Gather

- Grid paper: Activity 1, Activity 2

Materials to Copy

- 0-9 Digit Cards (groups of 2): Activity 2

Lesson Timeline

Warm-up	10 min
Activity 1	15 min

Teacher Reflection Question

What question do you wish you had asked today? What kept you from asking the question?

Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

Cool-down (to be completed at the end of the lesson)

🕒 5 min

Populations of Three Cities

Standards Alignments

Addressing 4.NBT.B.4

Student-facing Task Statement

The populations, in 2017, of the three largest cities in Wisconsin are shown.

city	population
Milwaukee	595,351
Madison	255,214
Green Bay	105,116

1. Was the total population of the three cities more than one million people? Explain or show your reasoning.
2. How much over or under one million is the total? Explain or show your reasoning.

Student Responses

1. No. Sample response: Milwaukee had about 600,000 people. Madison had about 255,000 people. Green Bay had about 105,000 people. The sum of the three estimates is 960,000 people.
2. 44,319 people below one million. Sample response:
 - The sum of populations of Milwaukee and Madison is $595,351 + 255,214$, which is 850,565 people. Adding the population of Green Bay, $850,565 + 105,116$, gives 955,681 people. Subtracting 955,681 people from 1,000,000 people gives 44,319 people.
 - The total population of the three cities is 955,681 people. I kept adding numbers to

that total until reaching 1,000,000 people. I first added 40,000 people and then 4,000 people, which gives 999,681 people. Adding 319 people more gives 1,000,000 people. Then I added these numbers: $40,000 + 4,000 + 319 = 44,319$.

- Subtracting the population of Milwaukee from one million, $1,000,000 - 595,351$, gives 404,649 people. Subtracting the population of Madison from 404,649 people gives 149,435 people. Subtracting the population of Green Bay from 149,435 people gives 44,319 people.

Begin Lesson

Warm-up

🕒 10 min

True or False: Sums and Differences

Standards Alignments

Addressing 4.NBT.B.4

This warm-up prompts students to look carefully at the sum and difference of the digits in each place and to remember to compose units when needed. It also prompts students to make use of structure (MP7). For example, the last expression would be cumbersome to calculate with the standard algorithm. Recognizing that 99,999 is 1 less than 100,000 would enable students to find the difference much more quickly. Likewise, students who notice that $300,000 + 99,999$ is only 1 away from 400,000 would know that 311,111 is far too high and cannot be the difference between 400,000 and 99,999.

Instructional Routines

True or False

Student-facing Task Statement

Decide if each statement is true or false. Be prepared to explain your reasoning.

- $7,000 + 3,000 = 10,000$
- $7,180 + 3,920 = 10,100$
- $423,450 - 42,345 = 105$

Launch

- Display one statement.
- "Give me a signal when you know whether the statement is true and can explain how you know."
- 1 minute: quiet think time

- $400,000 - 99,999 = 311,111$

Student Responses

- True: $7,000 + 3,000 = 10,000$
- False: $7,000 + 3,000 = 10,000$ so $7,180 + 3,920$ has to be more than 10,100.
- False: the difference between 420,000 and 42,000 is more than 300,000 so the difference between 432,450 and 42,345 cannot be only 105.
- False: 99,999 is just 1 away from 100,000, so the difference between 400,000 and 99,999 should be just 1 over 300,000, not 11,111 over 300,000.

Activity

- Share and record answers and strategy.
- Repeat with each statement.

Synthesis

- “How can you explain your answer without finding the value of both sides?”

Activity 1

🕒 15 min

The Fundraiser

Standards Alignments

Addressing 4.NBT.B.4

In this activity, students perform multi-digit addition and subtraction to solve problems in context and assess the reasonableness of answers. The situation can be approached in many different ways, such as:

- Arrange the numbers in some way before adding or subtracting.
- Add the largest numbers first.
- Add two numbers at a time.
- Add numbers with the same number of digits.
- Subtract each expense, one by one, from the amount collected.

Students reason abstractly and quantitatively when they make sense of the situation and decide what operations to perform with the given numbers (MP2).

This activity uses *MLR6 Three Reads*. Advances: reading, listening, representing

Instructional Routines

MLR6 Three Reads

Materials to Gather

Grid paper

Student-facing Task Statement

A school's track teams raised \$41,560 from fundraisers and concession sales.

In the fall, the teams paid \$3,180 for uniforms, \$1,425 in entry fees for track meets, and \$18,790 in travel costs.

In the spring, the teams paid \$10,475 in equipment replacement, \$1,160 for competition expenses, and \$912 for awards and trophies.

1. Was the amount collected enough to cover all the payments? Explain or show how you know.
2. If the amount collected was enough, how much money did the track teams have left after paying all the expenses? If it was not enough, how much did the track teams overspend? Explain or show how you know.

Student Responses

1. Yes. Sample response: I estimated the sum of all expenses to be about \$36,000. This is a few thousand dollars less than \$41,560.
2. The track teams had \$5,618 left. Sample response:
 $3,180 + 1,425 + 18,790 = 23,395$
 $10,475 + 1,160 + 912 = 12,547$
 $23,395 + 12,547 = 35,942$
 $41,560 - 35,942 = 5,618$

Launch

- Groups of 2

MLR6 Three Reads

- Display only the problem stem, without revealing the questions.
- "We are going to read this problem 3 times."
- 1st Read: Read both parts of the problem including fall and spring purchases.
- "What is this story about?"
- 1 minute: partner discussion.
- Listen for and clarify any questions about the money raised and the money paid.
- 2nd Read: Read both parts of the problem including fall and spring purchases.
- "What are all the things we can count in this story?" (costs of uniforms, meet fees, competition expenses, awards, travel costs)
- 30 seconds: quiet think time
- 2 minutes: partner discussion
- Share and record all quantities.
- Reveal the questions
- 3rd Read: Read the entire problem, including question(s) aloud.
- "What are different ways we can solve this problem?"
- 30 seconds: quiet think time
- 1–2 minutes: partner discussion

Activity

- 3–5 minutes: partner work time

Synthesis

- Invite students who solved the problem in different ways to share.

Activity 2

🕒 20 min

The Least and the Greatest of Them All

Standards Alignments

Building On 4.NBT.A.1, 4.NBT.A.2
Addressing 4.NBT.B.4

In this activity, students practice adding and subtracting multi-digit numbers through a game. Students draw several cards containing single-digit numbers, arrange the cards to form two numbers that would give the greatest and the least sums and differences. To meet these criteria, students look for and make use of structure in base-ten numbers (MP7).

🕒 Access for Students with Disabilities

Action and Expression: Develop Expression and Communication. Provide access to blank four-squares labeled as the greatest possible sum, the least possible sum, the greatest possible difference, and the least possible difference. Invite students to use this template to keep their work organized.
Supports accessibility for: Organization, Attention

Materials to Gather

Grid paper

Materials to Copy

0-9 Digit Cards (groups of 2)

Student-facing Task Statement

Your teacher will give you and your partner a set of 10 cards, each with a number between 0 and 9. Shuffle the cards and put them face down.

Launch

- Groups of 2
- A set of 10 cards (from the Instructional master) for each group, each card with a

1. Draw 3 cards. Use all 3 cards to form two different numbers that would give:

- a. the greatest possible sum

$$\begin{array}{r} \square \square \square \\ + \square \square \square \\ \hline \end{array}$$

- b. the least possible sum

$$\begin{array}{r} \square \square \square \\ + \square \square \square \\ \hline \end{array}$$

- c. the greatest possible difference

$$\begin{array}{r} \square \square \square \\ - \square \square \square \\ \hline \end{array}$$

- d. the least possible difference

$$\begin{array}{r} \square \square \square \\ - \square \square \square \\ \hline \end{array}$$

2. Shuffle the cards and draw 4 cards. Use them to form two different numbers that would give:

- a. the greatest possible sum

$$\begin{array}{r} \square \square \square \square \\ + \square \square \square \square \\ \hline \end{array}$$

- b. the least possible sum

single-digit number (0–9).

- “How many three-digit numbers could we form with 1, 2, and 3? Think of all of them.” (123, 132, 213, 231, 312, and 321)
- “Can you find a pair of numbers from your list that would produce the least sum? The greatest sum? The smallest difference? The greatest difference?”

Activity

- “Take turns picking cards, one card at a time.”
- “For the first problem, pick 3 cards. Work together to make three-digit numbers that would give the greatest and the least sums and differences.”
- “For the second problem, repeat with 4 cards. Check each other’s calculations.”
- 10 minutes: partner work time

Synthesis

- Ask students to share their sums and differences and the rest of the class to check if they actually are the greatest and least sums and differences.
- “After playing a couple of rounds, did you figure out how to find the greatest or least sum or difference more quickly? How?” (Answers vary. Students say they estimated using the place value of the first digits of each number.)

$$\begin{array}{r} \square, \square \square \square \\ + \square, \square \square \square \\ \hline \end{array}$$

c. the greatest possible difference

$$\begin{array}{r} \square, \square \square \square \\ - \square, \square \square \square \\ \hline \end{array}$$

d. the least possible difference

$$\begin{array}{r} \square, \square \square \square \\ - \square, \square \square \square \\ \hline \end{array}$$

Student Responses

- Sample response for the numbers 2, 5, and 8:
 - $852 + 825 = 1,677$
 - $258 + 285 = 543$
 - $852 - 258 = 594$
 - $285 - 258 = 27$
- Sample response for the numbers 0, 1, 3, and 7:
 - $7,310 + 7,301 = 14,611$
 - $137 + 173 = 310$ (the 0 is used in the thousands place)
 - $7,310 - 137 = 7,173$
 - $173 - 137 = 36$

Advancing Student Thinking

Students may randomly place numbers and use a guess-and-check method. To draw attention to place value and possible strategies, consider asking: "When making the largest sum possible, how do you decide which digits to choose for each place?"

Lesson Synthesis

 10 min

Display these numbers:

732 3,005 8,401 12,475 218,699

“In this lesson, you added and subtracted lots of large numbers to solve problems. Suppose we’re working with these large numbers.”

“What are some ways to estimate the sum or difference of a bunch of numbers without adding them?” (Round each number to make them easier to add or subtract. Look at the digits and the place values of the numbers involved to get a sense of the sizes of the numbers.)

“If careful calculations are needed, what are some ways to organize the numbers and add or subtract them efficiently?” Some ideas:

- Start with the largest numbers first.
- Start with the numbers with more zeros and fewer non-zeros.
- Start with computations that would result in multiples of 10, 100, 1,000, and so on, which would make other calculations easier. For example, in the given list of numbers, we could add 218,699 and 8,401 first because it’d give 227,100, and then add 12,475 and 3,005 because they both end in 5 and would add up to 15,480.

“How might we find two numbers that give the greatest sum or greatest difference without trying to find the sum and difference of every pair of numbers?” (Pay attention to the size of each number, based on the number of digits and their place values.)

Student Section Summary

In this section, we used our understanding of place value and expanded form to add and subtract large numbers using the standard algorithm.

We learned how to use the algorithm to keep track of addition of digits that results in a number greater than 9.

Whenever we have 10 in a unit, we make a new unit and record the new unit at the top of the column of numbers in the next place to the left.

$$\begin{array}{r}
 1 \\
 26,815 \\
 + 11,403 \\
 \hline
 38,218
 \end{array}$$

When we subtract numbers it may be necessary to decompose tens, hundreds, thousands or ten-thousands before subtracting.

Lesson 23: Bees are Buzzing (Optional)

Standards Alignments

Addressing 4.NBT.A, 4.NBT.B.4

Teacher-facing Learning Goals

- Add and subtract multi-digit whole numbers using the standard algorithm.
- Use place value understanding to make reasonable estimates.

Student-facing Learning Goals

- Let's investigate insect populations.

Lesson Purpose

The purpose of this lesson is to use estimation to make sense of a wide range of numbers and to use addition and subtraction to investigate how an insect population can change over time.

This lesson is optional because it does not address any new mathematical content standards. This lesson does provide students with an opportunity to apply precursor skills of mathematical modeling. In previous lessons, students developed place value understanding for numbers up to 1,000,000 and rounded, added, and subtracted numbers in this range. In this lesson, they apply their understandings and skills to make sense of facts about insects and investigate how an insect population changes over time.

Students make decisions and choices, adhere to mathematical constraints, use mathematical ideas to analyze real-world situations, and interpret a mathematical answer and whether it makes sense in the context of a situation. In doing so, they model with mathematics (MP4).

Access for:

Students with Disabilities

- Representation (Activity 2)

English Learners

- MLR5 (Activity 1)

Instructional Routines

Estimation Exploration (Warm-up)

Lesson Timeline

Warm-up

10 min

Teacher Reflection Question

As students worked together today, where did

Activity 1	20 min	you see evidence of a mathematical community?
Activity 2	15 min	
Lesson Synthesis	10 min	

Begin Lesson

Warm-up

🕒 10 min

Estimation Exploration: Bees

Standards Alignments

Addressing 4.NBT.A

The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information. Students consider a picture of bees to familiarize them with a context that will be used later in the lesson.

Instructional Routines

Estimation Exploration

Student-facing Task Statement



Launch

- Groups of 2
- Display image.
- “This is an image of a bee hive. How many bees do you think are in the image?” “What is an estimate that’s too high?” “Too low?” “About right?”
- 1 minute: quiet think time

Activity

- “Discuss your thinking with your partner.”
- 1 minute: partner discussion

Record an estimate that is:

too low	about right	too high

Student Responses

Sample responses

- Too low: 0–100 (The cluster in the lower right corner is already 20, so it's definitely more than 100.)
- About right: 500
- Too high: Greater than 10,000 (100 rows of 100 bees is 10,000, and picture would not fit 100 across each side.)

- Record responses.

Synthesis

- "Is anyone's estimate less than 100? Is anyone's estimate greater than 1,000?"
- "Based on this discussion, does anyone want to revise their estimate?"
- "What are some other insects or bugs you know or have seen?"

Activity 1

🕒 20 min

Termites, Ants, and Bees

Standards Alignments

Addressing 4.NBT.A

In this activity, students use rounding skills to make sense of numbers in the context of insect population. Students use given numerical facts about insects to determine what a variety of numbers could represent. For many of the numbers, several choices are possible.

The work here offers students many opportunities to attend to precision (MP6). For instance, students may say that 2.4 represents the length of an ant or 30 represents how long a queen termite lives. Urge students to clarify the quantities they stated: "Did you mean 2.4 inches?" "Does 30 represent how many months a queen termite lives?"

Access for English Learners

MLR5 Co-Craft Questions. Display only the image of the beehive. Ask, “What mathematical questions could be asked about this image?” Give groups 2–3 minutes to write a list of questions, then invite each group to contribute one written question to a whole-class display. Ask the class to make comparisons among the shared questions and their own. Reveal the intended questions for this task and invite additional connections.

Advances: Reading, Writing

Student-facing Task Statement

Here is some information about insects:

Termites

- Size of a colony:
100–1,000,000
- A queen lives for 30–50 years.
- There are 3,000–3,500 species of termites.
- The length of a termite is 4 to 15 millimeters.
- In some species, the mature queen may produce around 40,000 eggs a day.



Odorous House Ants

- Size of colony: up to 100,000
- A queen lives for 300–1,800 days.
- The length of an ant is 1.5–3.2 millimeters.
- Foraging ants travel up to 700 feet from their nests.
- There are 12,000–22,000



Launch

- Groups of 2
- “An entomologist is a scientist who studies insects. Today, we’ll learn some facts about a few insects.”
- Read facts aloud. Clarify new words if needed.

Activity

- 2 minutes: independent work time
- 8 minutes: partner work time
- Monitor for students who:
 - think of multiple quantities that the same number might represent
 - use estimation in their reasoning

Synthesis

- Invite previously selected students to share their responses and reasoning.
- “Was there any number that could represent only one possible fact about termites, ants, or honey bees?” (2.4 represents the length of an ant in millimeters, and 530,097 represents the size of a termite colony.)
- “Was there a number that could represent many facts about the insects?” (487, 1794, 6905)

possible species.

Honey Bees



- Size of a hive:
10,000–60,000
- There are around 500 drones in a hive.
- A queen can lay about 1,500–2,000 eggs each day.
- A hive produces 7–40 liters of honey in a season.
- The length of a bee is 10–20 millimeters.

1. Here are some numbers that could represent facts about termites, house ants, and honey bees. What might each number represent?

number	what it might represent
2.4	
8	
487	
1,794	
6,905	
20,799	
530,097	

2. Add another number to the list. What about the insects might this number represent?
3. Discuss your answers with your partner. Be prepared to show or explain your reasoning.

Student Responses

1. Sample response:

number	might represent
2.4	length of an ant in millimeters
8	liters of honey a hive produces
487	number of feet that an ant travels

- “What could 487 definitely not be?” (Sample response: The length of any of the insects in millimeters.)
- “In the next activity, we are going to look at bees and investigate how a bee population changes over time. Studying population changes is something that many scientists do in many fields.”

number	might represent
1,794	number of eggs a queen bee lays
6,905	size of an ant colony
20,799	size of a bee hive
530,097	size of a termite colony

2. 45. It represents the number of years a queen can live.

Activity 2

🕒 15 min

Bee Population

Standards Alignments

Addressing 4.NBT.B.4

In this activity, students investigate how a bee population changes over time. Population modeling is an important application of mathematics in many fields of study such as demography, biology, and infectious diseases. Students use a simplified model to show population change over time by using the number of individuals added and subtracted at each time interval:

$$\text{new population} = \text{old population} + \text{inflow} - \text{outflow}$$

In this activity, students are given some of the numbers and are to reason whether they need to add or subtract to fill in the missing information.

🕒 Access for Students with Disabilities

Representation: Develop Language and Symbols. Represent the problem in multiple ways to support understanding of the situation. For example, represent the situation with a visual or animation.

Supports accessibility for: Conceptual Processing, Attention

Student-facing Task Statement

An entomologist records the number of bees in their beehive over the course of several months.

Launch

- Groups of 2
- “Bees live in hives. We saw a picture of the

They record:

- the number of bees at the beginning of the month
- how many bees left (and didn't return) during the month
- how many new bees were added to the hive during the month

Unfortunately, some of the entries in the table are missing.

1. Complete the missing information in the table.

month	bees in the hive at the beginning of the month	new bees	bees that left the hive
May	20,000	9,378	342
June		15,870	970
July		14,965	
August	58,107		28,980
September	30,017	No data	No data

2. Discuss your responses with your partner. Be prepared to show or explain your reasoning.

Student Responses

month	bees in the hive at the beginning of the month	new bees	bees that left the hive
May	20,000	9,378	342
June	29,036	15,870	970
July	43,936	14,965	794
August	58,107	890	28,980
September	30,017	No data	No data

inside of a hive in the warm-up. The number of bees in one hive can change throughout the year. For example, in the summer, when there are lots of flowers blooming, the population grows. In the winter, the population is a lot smaller."

- "Beekeepers and entomologists are interested in knowing how many bees are in a hive over time. An entomologist is a scientist who studies insects."
- "The table shows information about the number of bees in one particular hive. Look at the first row. What information do we get about the beehive?" (There were 20,000 to start with, 9378 bees were born or added, and 342 bees left.)
- Display the table in the activity.
- "What do you notice? What do you wonder?"
- 30 seconds: quiet think time
- Share responses.
- "How might we find out the number of bees at the beginning of June?"
- 30 seconds: quiet think time
- 1 minute: partner discussion
- Share responses.
- "Use the given information to complete the table."

Activity

- 10 minutes: independent work time
- 2 minutes: partner discussion
- Monitor for students who:
 - use the standard algorithm to add and subtract the numbers
 - are able to explain why they used addition or subtraction

Synthesis

- “How did you decide which operation to use to complete each cell?” (If I had the starting number, I could add the new bees and subtract the bees that left to get the number in the next month.)
- “How did you find the number of bees in the hive at the beginning of the month?”
- “What other mathematical questions can we ask?” (How many total bees were born? How many total bees left the hive? What month had the most or fewest bees?)

Lesson Synthesis

🕒 10 min

“Today we explored how the population of bees can change over time.”

“What did you learn today about the mathematics an entomologist might use as part of their work?” (They use numbers to describe insect populations and to keep track of the number of insects in a colony. They use big and small numbers and they add and subtract a variety of numbers.)

CKMath™
Core Knowledge **MATHEMATICS™**



Family Support
Materials

Family Support Materials

From Hundredths to Hundred-thousands

In this unit, students learn to express small and large numbers, from hundredths to hundred-thousands. They learn to write tenths and hundredths using decimal notation and to work with whole numbers within 1 million.

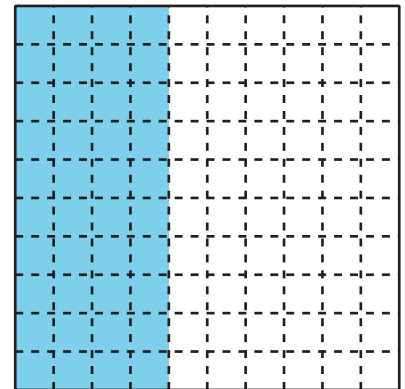
Section A: Decimals with Tenths and Hundredths

In this section, students relate the fraction $\frac{1}{10}$ to the notation 0.1 and $\frac{1}{100}$ to 0.01. They learn to read 0.1 as “one tenth” and 0.01 as “one hundredth.”

To connect the fraction notation, decimal notation, and word name of a fraction, students reason with square diagrams that each represent 1 and are partitioned into hundredths.

The gridded square helps students see that $\frac{1}{10}$ (or 0.1) and $\frac{10}{100}$ (or 0.10) represent the same amount. It also allows students to recognize other tenths and hundredths that are equivalent.

For instance, the shaded parts of this diagram represent both 40 hundredths ($\frac{40}{100}$) and 4 tenths ($\frac{4}{10}$), so $0.4 = 0.40$.



Later in the section, students locate decimals on number lines. They compare decimals based on size and write comparison statements using the symbols $<$, $>$, and $=$.

Section B: Place-value Relationships through 1,000,000

In this section, students make sense of whole numbers up to the hundred-thousands place. They use base-ten blocks and diagrams to represent large numbers.

Students come to understand the value of the digit in each position in a multi-digit number. They see that a digit in one place has a value that is ten times the value of the same digit in a place to its right.



For example, the 3 in 347,000 has a value ten times that of the 3 in 34,700, because $300,000 = 10 \times 30,000$.

CKMath™
Core Knowledge **MATHEMATICS™**

Unit Assessments

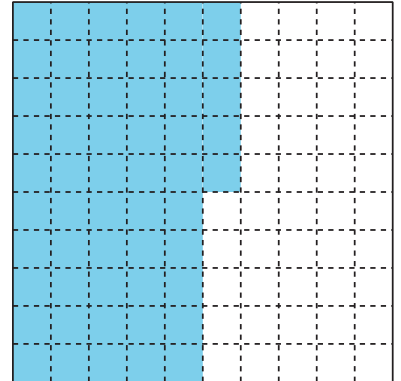
Check Your Readiness A, B, C and D
End-of-Unit Assessment

From Hundredths to Hundred-thousands: Section A Checkpoint

1. The large square represents 1.

What number is represented by the shaded parts?

Write your answer both as a fraction and as a decimal.



2. Estimate the location of the following numbers on the number line:

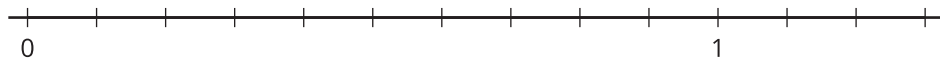
0.43

0.3

0.09

1.2

1.02



3. Order the following numbers from least to greatest:

6.52

6.4

6.39

6.53

6.6

From Hundredths to Hundred-thousands: Section B Checkpoint

1. Write the number 436,089 in expanded form and in word form.

2. Select **all** numbers in which the value of the 7 is 70,000.
 - A. 718,403
 - B. 178,509
 - C. 807,135
 - D. 789,260
 - E. 987,631
 - F. 978,011

3. Write a number where the value of the 5 is 10 times the value of the 5 in 152,318.

From Hundredths to Hundred-thousands: Section C Checkpoint

1. Order the following mountain peaks in Colorado from highest to lowest:

mountain	height (feet)
Grays Peak	14,278
Mount Elbert	14,440
Mount Yale	14,199
Castle Peak	14,265
Pikes Peak	14,115
Mount Ouray	13,971
Mount Princeton	14,196

2. Round the number 569,843 to the:

- a. nearest thousand

- b. nearest ten-thousand

- c. nearest hundred-thousand

From Hundredths to Hundred-thousands: Section D Checkpoint

1. Find the value of each sum or difference:

$$\begin{array}{r} 26,594 \\ + 6,723 \\ \hline \end{array}$$

$$\begin{array}{r} 357,168 \\ - 258,429 \\ \hline \end{array}$$

2. Find the value of $100,058 - 86,249$. Show your reasoning.

From Hundredths to Hundred-thousands: End-of-Unit Assessment

1. Select **all** representations of the number 89,500.

- A. Eighty-nine thousand five hundred
- B. Eight thousand nine hundred fifty
- C. $8,000 + 900 + 50$
- D. $80,000 + 5,000 + 90$
- E. $80,000 + 9,000 + 500$

2. Write $<$ or $>$ in each blank to make the statement true.

a. $587,207$ _____ $591,025$

b. $127,937$ _____ $97,941$

c. $386,981$ _____ $386,898$

3. The distance between New York City and Boston is 225 miles. The distance between New York City and Salt Lake City is 10 times as far. How many miles is it between New York City and Salt Lake City? Explain or show your reasoning.

4. Select **all** expressions with the same value as $\frac{30}{100}$.

A. $\frac{3}{10}$

B. 0.03

C. $\frac{2}{10} + \frac{3}{100} + \frac{7}{10}$

D. 0.30

E. $\frac{2}{10} + \frac{10}{100}$

F. 0.33

5. Find the sum or difference.

a.
$$\begin{array}{r} 324,567 \\ + \quad 34,762 \\ \hline \end{array}$$

b.
$$\begin{array}{r} 827,419 \\ - \quad 80,125 \\ \hline \end{array}$$

6. Clare, Han, and Andre each ran 40 yards. It took Clare 6.8 seconds and Han 6.9 seconds. Andre finished in less time than Han but more time than Clare. What could Andre's time be? Explain or show your reasoning.

7. Select **all** true statements.

- A. 287,164 rounded to the nearest hundred-thousand is 200,000.
- B. 287,164 rounded to the nearest ten-thousand is 290,000.
- C. 287,164 rounded to the nearest thousand is 287,000.
- D. 287,164 rounded to the nearest hundred is 287,100.
- E. 287,164 rounded to the nearest ten is 287,170.

8. A school district in Los Angeles reported 633,621 students in 2016. A school district in New York City reported 984,462 students in the same year.

a. Which school district had more students? Explain your reasoning.

b. How many more students? Explain or show your reasoning.

c. How many more students does the school district in New York need to have 1,000,000 students? Explain or show your reasoning.

CKMath™
Core Knowledge **MATHEMATICS™**

Assessment Answer Keys

Check Your Readiness A, B, C and D
End-of-Unit Assessment

Assessment Answer Keys

Assessment: Section A Checkpoint

Problem 1

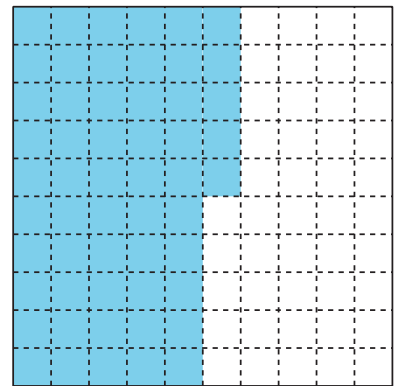
Goals Assessed

- Write tenths and hundredths in decimal notation.

The large square represents 1.

What number is represented by the shaded parts?

Write your answer both as a fraction and as a decimal.



Solution

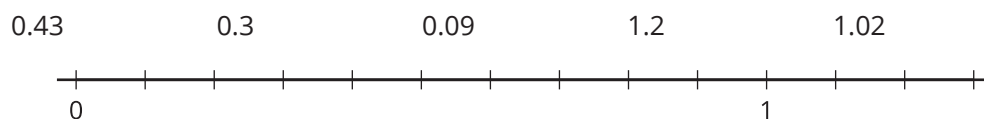
$$\frac{55}{100} \text{ or } 0.55$$

Problem 2

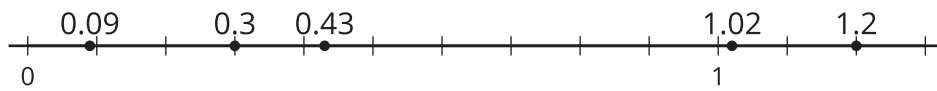
Goals Assessed

- Represent, compare, and order decimals to the hundredths by reasoning about their size.

Estimate the location of the following numbers on the number line:



Solution



Problem 3

Goals Assessed

- Represent, compare, and order decimals to the hundredths by reasoning about their size.

Order the following numbers from least to greatest:

6.52

6.4

6.39

6.53

6.6

Solution

6.39, 6.4, 6.52, 6.53, 6.6

Assessment: Section B Checkpoint

Problem 1

Goals Assessed

- Read, represent, and describe the relative magnitude of multi-digit whole numbers up to 1 million.

Write the number 436,089 in expanded form and in word form.

Solution

Expanded form: $400,000 + 30,000 + 6,000 + 80 + 9$

Word form: four hundred thirty-six thousand eighty-nine

Problem 2

Goals Assessed

- Read, represent, and describe the relative magnitude of multi-digit whole numbers up to 1 million.

Select **all** numbers in which the value of the 7 is 70,000.

- A. 718,403
- B. 178,509
- C. 807,135
- D. 789,260
- E. 987,631
- F. 978,011

Solution

["B", "F"]

Problem 3

Goals Assessed

- Recognize that in a multi-digit whole number, the value of a digit in one place represents ten times what it represents in the place to its right.

Write a number where the value of the 5 is 10 times the value of the 5 in 152,318.

Solution

Sample response: 517,908

Assessment: Section C Checkpoint

Problem 1

Goals Assessed

- Compare, order, and round multi-digit whole numbers within 1,000,000.

Order the following mountain peaks in Colorado from highest to lowest:

mountain	height (feet)
Grays Peak	14,278
Mount Elbert	14,440
Mount Yale	14,199
Castle Peak	14,265
Pikes Peak	14,115
Mount Ouray	13,971
Mount Princeton	14,196

Solution

Mount Elbert, Grays Peak, Castle Peak, Mount Yale, Mount Princeton, Pikes Peak, Mount Ouray

Problem 2

Goals Assessed

- Compare, order, and round multi-digit whole numbers within 1,000,000.

Round the number 569,843 to the:

- a. nearest thousand

- b. nearest ten-thousand
- c. nearest hundred-thousand

Solution

- a. 570,000
- b. 570,000
- c. 600,000

Assessment: Section D Checkpoint

Problem 1

Goals Assessed

- Use the standard algorithm to add and subtract multi-digit whole numbers within 1 million that may require composition or decomposition.

Find the value of each sum or difference:

$$\begin{array}{r} 26,594 \\ + 6,723 \\ \hline \end{array}$$

$$\begin{array}{r} 357,168 \\ - 258,429 \\ \hline \end{array}$$

Solution

$$\begin{array}{r} 111 \\ 26,594 \\ + 6,723 \\ \hline 33,317 \end{array}$$

$$\begin{array}{r} 1416 \\ 2\cancel{4}\cancel{0}11518 \\ \cancel{3}\cancel{5}\cancel{7}\cancel{1}\cancel{0}\cancel{8} \\ - 258,429 \\ \hline 98,739 \end{array}$$

Problem 2

Goals Assessed

- Use the standard algorithm to subtract multi-digit whole numbers with non-zero digits from numbers that contain multiple zero digits.

Find the value of $100,058 - 86,249$. Show your reasoning.

Solution

13,809. Sample response:

Assessment: End-of-Unit Assessment

Problem 1

Standards Alignments

Addressing 4.NBT.A.2

Narrative

Students identify how to represent a number using words or expanded form. Students who select B, C, or D either have not looked carefully at the given number or need extra practice with place value. Students who select more than one of B, C, or D need extra review with the meaning of place value. Note that responses B and C go together so a student who selects one should logically select the other as well.

Select **all** representations of the number 89,500.

- A. Eighty-nine thousand five hundred
- B. Eight thousand nine hundred fifty
- C. $8,000 + 900 + 50$
- D. $80,000 + 5,000 + 90$
- E. $80,000 + 9,000 + 500$

Solution

["A", "E"]

Problem 2

Standards Alignments

Addressing 4.NBT.A.2

Narrative

Students compare numbers within 1,000,000. Students who answer the last problem incorrectly may have been careless as the digits are the same in the leftmost three places. If students answer

more than one of these inequalities incorrectly they need more work with place value and using $<$ and $>$ to compare numbers.

Write $<$ or $>$ in each blank to make the statement true.

- a. 587,207 _____ 591,025
- b. 127,937 _____ 97,941
- c. 386,981 _____ 386,898

Solution

- a. $<$
- b. $>$
- c. $>$

Problem 3

Standards Alignments

Addressing 4.NBT.A.1

Narrative

Students multiply a whole number by 10 in context and explain why the digits are the same but they are shifted to the left by one place and there is a 0 at the end. Students can think about this in many ways, for example

- drawing diagrams of base-ten blocks
- thinking about the meaning of each place value in a whole number
- thinking about 225 in expanded form and multiplying each part by 10

The distance between New York City and Boston is 225 miles. The distance between New York City and Salt Lake City is 10 times as far. How many miles is it between New York City and Salt Lake City? Explain or show your reasoning.

Solution

It is 2,250 miles from New York City to Salt Lake City. The first 3 digits in 2,250 are the same as those in 225 but their values are all multiplied by 10 because they are one place further to the left.

Problem 4

Standards Alignments

Addressing 4.NF.C.5, 4.NF.C.6

Narrative

Students find expressions equivalent to a given fraction with a denominator of 100. Some of the expressions are given as decimals so students demonstrate understanding how to express a fraction as a decimal or a decimal as a fraction. Students who select B or F or fail to select D need further work understanding the fraction equivalent of a decimal number. Students who select C or fail to select E may need further work with fractions having denominators 10 and 100.

Select **all** expressions with the same value as $\frac{30}{100}$.

- A. $\frac{3}{10}$
- B. 0.03
- C. $\frac{2}{10} + \frac{3}{100} + \frac{7}{10}$
- D. 0.30
- E. $\frac{2}{10} + \frac{10}{100}$
- F. 0.33

Solution

["A", "D", "E"]

Problem 5

Standards Alignments

Addressing 4.NBT.B.4

Narrative

Students find a sum and a difference without a context. The problems are arranged in a way that encourages the use of the standard algorithm. Students can use any strategy that makes sense to them, including using the standard algorithms or their understanding of place value.

Find the sum or difference.

a.
$$\begin{array}{r} 324,567 \\ + 34,762 \\ \hline 827,419 \end{array}$$

b.
$$\begin{array}{r} 827,419 \\ - 80,125 \\ \hline \end{array}$$

Solution

a. 359,329

$$\begin{array}{r} 11 \\ 324,567 \\ + 34,762 \\ \hline 359,329 \end{array}$$

b. 747,294

$$\begin{array}{r} 712311 \\ \cancel{8}27, \cancel{4}19 \\ - 80,125 \\ \hline 747,294 \end{array}$$

Problem 6

Standards Alignments

Addressing 4.NF.C.7

Narrative

Students find a decimal between two decimal numbers using time as a context. Since the two times given are in tenths of a second, 6.8 and 6.9, students need to realize that they can only find a decimal between these two numbers if they use hundredths. They may draw a number line showing hundredths between 6.8 and 6.9 or they may reason that 6.8 and 6.9 can be written as 6.80 and 6.90.

Clare, Han, and Andre each ran 40 yards. It took Clare 6.8 seconds and Han 6.9 seconds. Andre finished in less time than Han but more time than Clare. What could Andre's time be? Explain or show your reasoning.

Solution

Sample response: Andre's time could be 6.83 seconds. Clare's time is 6.80 seconds and Han's time is 6.90 so I need some number of hundredths between 80 and 90. Since 83 is between 80 and 90, 6.83 is between 6.80 and 6.90.

Problem 7

Standards Alignments

Addressing 4.NBT.A.3

Narrative

Students round a number to different place values without the support of a number line. Students may draw a number line to help visualize the numbers but they will need to label those number lines carefully in order for them to be helpful. Students may select A, D and E, and not select B, if they simply drop the smaller place values from the number which would mean that they always round down. Other mistakes may occur because they are not reading the 6-digit number carefully.

Select **all** true statements.

- A. 287,164 rounded to the nearest hundred-thousand is 200,000.
- B. 287,164 rounded to the nearest ten-thousand is 290,000.
- C. 287,164 rounded to the nearest thousand is 287,000.
- D. 287,164 rounded to the nearest hundred is 287,100.
- E. 287,164 rounded to the nearest ten is 287,170.

Solution

["B", "C"]

Problem 8

Standards Alignments

Addressing 4.NBT.B.4

Narrative

Students compare and subtract whole numbers within one million. They can use any method to perform the subtraction. To find the difference between the two school districts, the standard algorithm is a likely choice. To find how many more students are needed to reach one million, adding on is a useful strategy and the way the problem is worded encourages this strategy.

data from here:

https://en.wikipedia.org/wiki/List_of_the_largest_school_districts_in_the_United_States_by_enrollment

A school district in Los Angeles reported 633,621 students in 2016. A school district in New York City reported 984,462 students in the same year.

- Which school district had more students? Explain your reasoning.
- How many more students? Explain or show your reasoning.
- How many more students does the school district in New York need to have 1,000,000 students? Explain or show your reasoning.

Solution

- The New York City district has more because the Los Angeles district has less than 700,000 students and the New York district has more than 900,000 students.
- 350,841. Sample response:

$$\begin{array}{r}
 3 \ 14 \\
 9 \ 8 \ ~~4~~, \ ~~4~~ \ 6 \ 2 \\
 - \ 6 \ 3 \ 3, \ 6 \ 2 \ 1 \\
 \hline
 3 \ 5 \ 0, \ 8 \ 4 \ 1
 \end{array}$$

- 15,538. Sample response: I need to add 15,537 to get 999,999 and then it's 1 more to 1,000,000.

CKMath™
Core Knowledge **MATHEMATICS™**

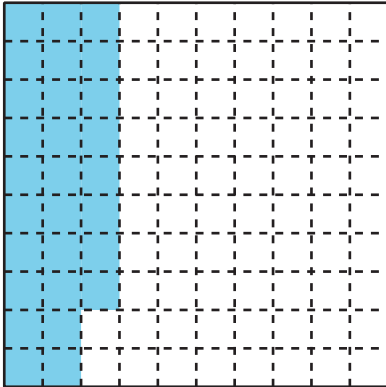


Lesson
Cool Downs

Lesson 1: Decimal Numbers

Cool Down: What Does It Represent?

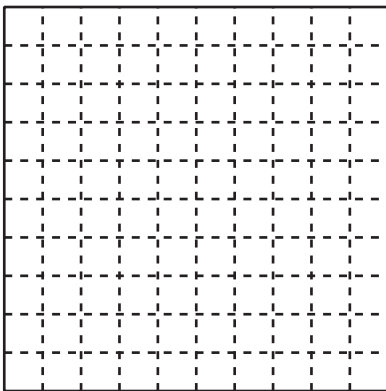
1. The large square represents 1.



a. What fraction does the shaded portion represent?

b. Write the fraction as a decimal.

2. The large square represents 1. Shade the diagram to represent 0.7.



Lesson 2: Equivalent Decimals

Cool Down: Equal or Not Equal?

1. Select **all** the statements that are true.

- a. $0.2 = 0.20$
- b. $5.40 = 5.04$
- c. $1.30 = 1.3$
- d. $0.07 = 0.70$
- e. $2.05 = 2.5$

2. Which of these numbers is equivalent to 0.9? Explain how you know they are equivalent.

- a. 0.09
- b. 0.90
- c. 9.0
- d. 9.09

Lesson 3: Decimals on Number Lines

Cool Down: More to Compare

1. Use $<$, $>$, or $=$ to make each comparison statement true. Use a number line if it is helpful.

a. 1.1 _____ 1.10

b. 0.9 _____ 0.19

c. 0.03 _____ 0.32

d. 5.91 _____ 5.01

e. 4.60 _____ 4.6

f. 3.73 _____ 3.83



Lesson 4: Compare and Order Decimals

Cool Down: From Least to Greatest

Order the numbers from least to greatest.

5.01 0.05 0.5 5.1 0.1 0.51

Lesson 5: Compare and Order Decimals and Fractions

Cool Down: Order Up

1. Order the numbers from least to greatest.

3.2 $3\frac{2}{100}$ 2.92 $2\frac{2}{10}$ 3.09

2. Use two numbers from your ordered set and the symbols $<$, $>$, or $=$ to write a true comparison statement.

Lesson 7: Numbers Within 100,000

Cool Down: Count Ten-thousands

Consider the number 57,000.

1. How many thousands are in it?
2. How many ten-thousands are in it?
3. Write the number in words.

Lesson 8: Beyond 100,000

Cool Down: Represent 234,000

1. Draw a diagram to represent 234,000.

2. Write 234,000 three different ways.

Lesson 10: Ten Times As Much

Cool Down: Same Digit, Different Place

Here are two numbers: 872,000 and 700,208

1.
 - a. What is the value of the 2 in each number?

 - b. Write a multiplication or division equation to show the relationship between these two values.

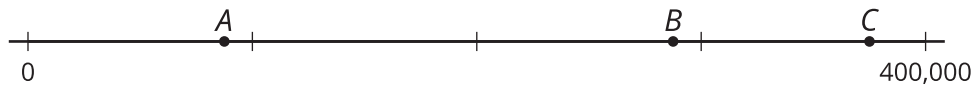
2.
 - a. What is the value of the 7 in each number?

 - b. Write a multiplication or division equation to show the relationship between these two values.

Lesson 11: Large Numbers on a Number Line

Cool Down: Ten Times on a Number Line

1. Estimate the location of 28,500 on the number line and label it with a point.



2. Which point—A, B, or C—could represent a number that is 10 times as much as 28,500? Explain your reasoning.

Lesson 12: Compare Multi-digit Numbers

Cool Down: Two Numbers To Compare

Here are two numbers, each with the same digit missing in different places.

$\boxed{1}\boxed{7}$, $\boxed{}\boxed{4}\boxed{2}$

$\boxed{1}\boxed{}$, $\boxed{7}\boxed{2}\boxed{4}$

1. If the missing digit in both numbers is 1, which number will be greater: the first or the second?

2. Name all the digits from 0 to 9 that will make the second number greater. Explain how you know.

Lesson 13: Order Multi-digit Numbers

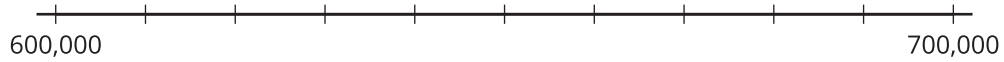
Cool Down: From Least to Greatest

Order the following numbers from least to greatest.

94,942 9,042 279,104 9,420 59,000 500,492 279,099

Lesson 14: Multiples of 10,000 and 100,000

Cool Down: Near 627,800



1.
 - a. Which two multiples of 10,000 are closest to 627,800?

 - b. Of the two multiples of 10,000, which one is closer to 627,800?

2.
 - a. Which two multiples of 100,000 are closest to 627,800?

 - b. Of the two multiples of 100,000 which one is closer to 627,800?

Lesson 15: The Nearest Multiples of 1,000, 10,000, and 100,000

Cool Down: The Nearest Multiples

1. Find each nearest multiple for the number 248,640. Use the number lines if they are helpful.

a. The nearest multiple of 100,000 is _____.



b. The nearest multiple of 10,000 is _____.



c. The nearest multiple of 1,000 is _____.



2. What is the nearest multiple of 1,000 and multiple of 10,000 for the number 173,500?

Lesson 16: Round Numbers

Cool Down: Round Three Ways

Round 569,003 to the nearest 100,000, 10,000 and 1,000. Explain or show your reasoning.

Lesson 17: Apply Rounding

Cool Down: Spatial Distancing

Planes are too close when their altitudes are within 1,000 feet of each other when they fly over the same area.

- Jada says planes C and E are too close.
- Noah says planes C and E are a safe-distance apart.

Use rounding to explain how both statements might be correct.

plane	altitude (feet)
A	40,990
B	39,524
C	36,138
D	40,201
E	35,472
F	30,956

Lesson 18: Standard Algorithm to Add and Subtract

Cool Down: Andre's Steps

Andre started tracking his steps. He walked 14,687 steps on Monday and 10,512 steps on Tuesday.

1. How many steps did he walk in those two days? Show your reasoning.

2. How many more steps did he walk on Monday than on Tuesday?

Lesson 19: Compose and Decompose to Add and Subtract

Cool Down: Difference and then Sum

1. Use the standard algorithm to find the difference.

a. $1,993 - 118$

b. $1,897 - 116$

2. Find the value of the sum.

$$\begin{array}{r} 827,499 \\ + \quad 80,125 \\ \hline \end{array}$$

Lesson 20: Add and Subtract Within 1,000,000

Cool Down: Subtract

Use the standard algorithm to find the value of the difference.

$$\begin{array}{r} 173,225 \\ - 114,329 \\ \hline \end{array}$$

Lesson 21: Zeros in the Standard Algorithm

Cool Down: Finding Differences

Use the standard algorithm to find each difference.

$$\begin{array}{r} 6,004 \\ - 842 \\ \hline \end{array}$$

$$\begin{array}{r} 9,090 \\ - 5,819 \\ \hline \end{array}$$

Lesson 22: Solve Problems Involving Large Numbers

Cool Down: Populations of Three Cities

The populations, in 2017, of the three largest cities in Wisconsin are shown.

city	population
Milwaukee	595,351
Madison	255,214
Green Bay	105,116

1. Was the total population of the three cities more than one million people? Explain or show your reasoning.

2. How much over or under one million is the total? Explain or show your reasoning.

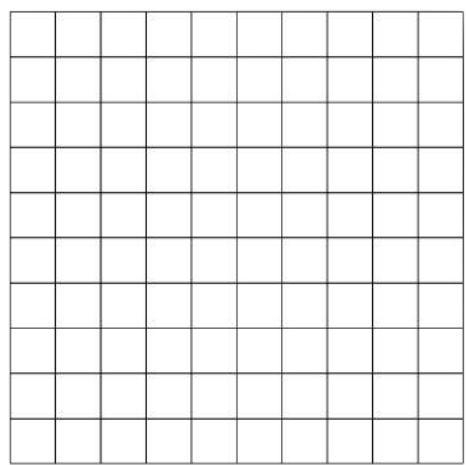
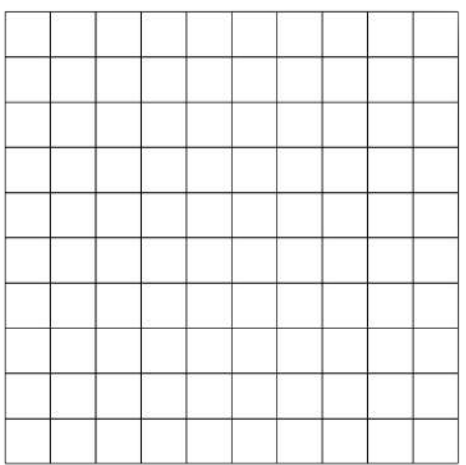
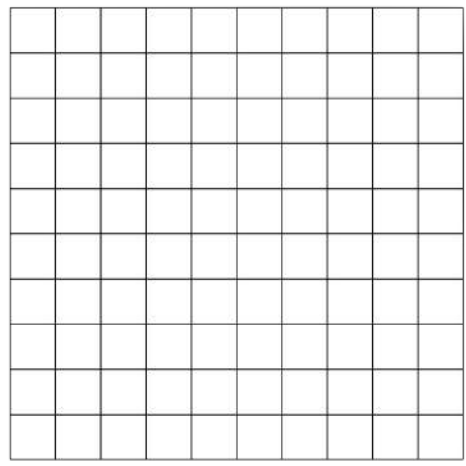
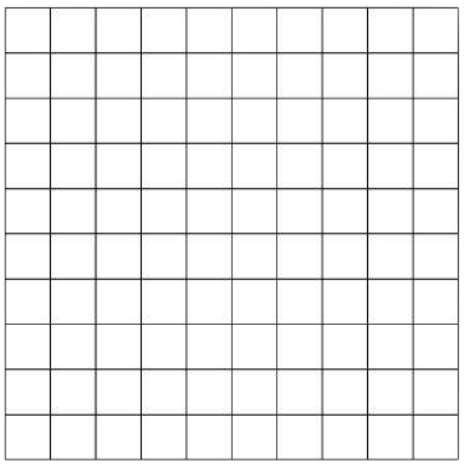
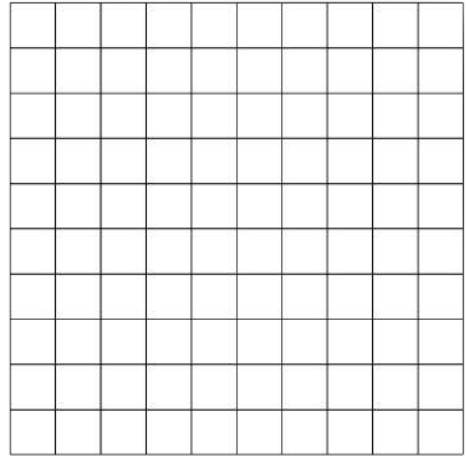
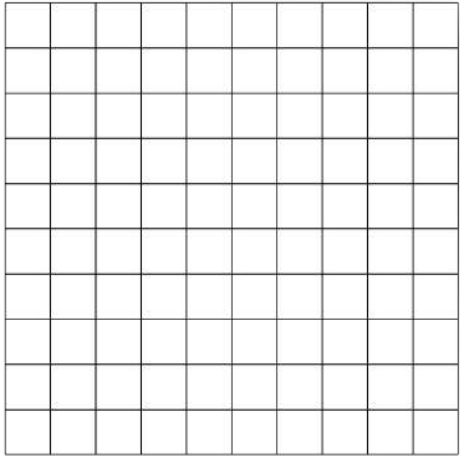
CKMath™
Core Knowledge **MATHEMATICS™**

Instructional Masters

Instructional Masters for From Hundredths to Hundred-thousands

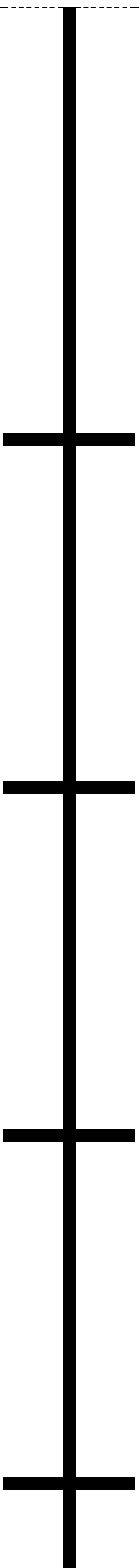
address	title	students written per copy	requires cutting?	card stock recommended?	color paper recommended?
Activity Grade4.4.6.2	10-by-10 Square Grids	1	yes	no	no
Activity Grade4.4.14.1	On Which Line Do They Belong? (0-700,000 number line)	30	yes	no	no
Activity Grade4.4.6.1	Build Numbers (1-5 Digit Cards)	4	no	no	no
Activity Grade4.4.22.2	0-9 Digit Cards	2	no	no	no
Activity Grade4.4.9.1	Card Sort: Large Numbers (4 to 6 digits)	2	no	no	no
Activity Grade4.4.2.1	Card Sort: Diagrams of Fractions & Decimals	2	no	no	no
Activity Grade4.4.5.1	Order Once, Order Twice	2	no	no	no
Center	Rolling for Fractions Stage 1 Recording Sheet	1	yes	no	no
Center	Get Your Numbers in Order Stage 3 and 4 Gameboard	2	yes	no	no
Center	Fraction Cards Grade 4	2	no	yes	no
Center	Fraction Cards Grade 3	2	no	yes	no
Center	Greatest of Them All Stage 2 Recording Sheet	1	yes	no	no
Center	Mystery Number Stage 4 Gameboard	2	no	no	no

Center	Greatest of Them All Stage 3 Recording Sheet	1	yes	no	no	no
Center	Tic Tac Round Stage 1 Gameboard	2	yes	no	no	no
Center	Tic Tac Round Stage 1 Spinner	2	no	no	no	no
Center	Mystery Number Stage 5 Gameboard	2	no	no	no	no
Center	Tic Tac Round Stage 2 Gameboard	2	yes	no	no	no
Center	Tic Tac Round Stage 2 Spinner	2	no	no	no	no
Center	Number Puzzles Addition and Subtraction Stage 6 Recording Sheet	1	yes	no	no	no

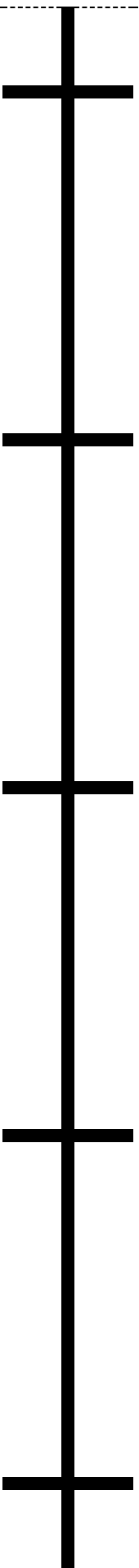


On Which Line Do They Belong? (0-700,000 number line)

0



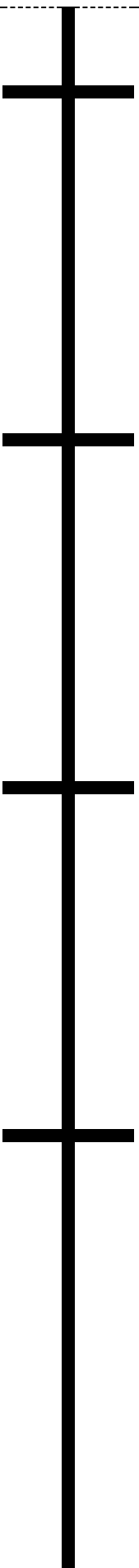
JOIN



JOIN

JOIN

JOIN



100,000

On Which Line Do They Belong? (0-700,000 number line)

100,000

JOIN

JOIN

JOIN

JOIN

200,000

On Which Line Do They Belong? (0-700,000 number line)

200,000

JOIN

JOIN

JOIN

JOIN

300,000

On Which Line Do They Belong? (0-700,000 number line)

300,000

JOIN

JOIN

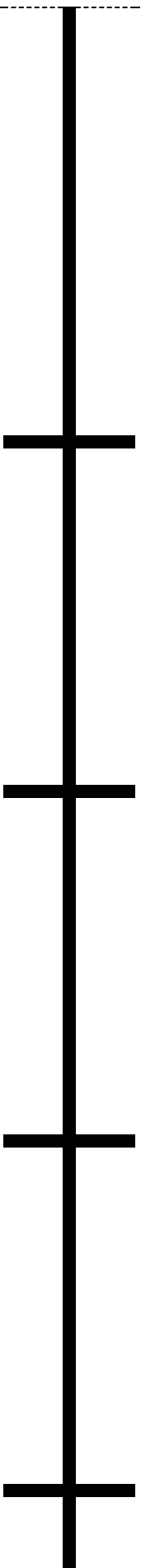
JOIN

JOIN

400,000

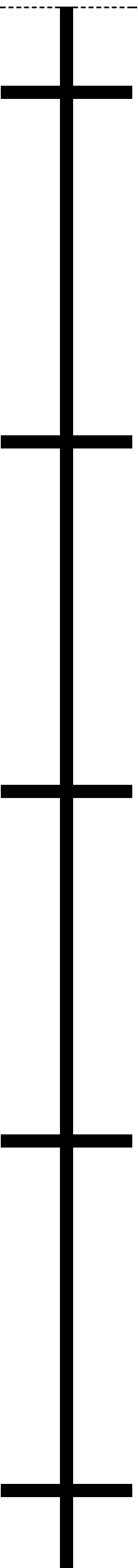
On Which Line Do They Belong? (0-700,000 number line)

400,000



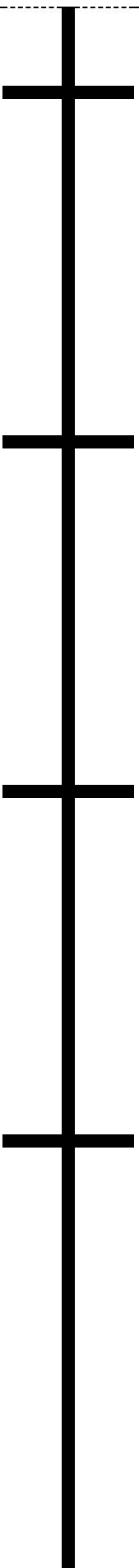
JOIN

JOIN



JOIN

JOIN



500,000

On Which Line Do They Belong? (0-700,000 number line)

500,000

JOIN

JOIN

JOIN

JOIN

600,000

On Which Line Do They Belong? (0-700,000 number line)

600,000

JOIN

JOIN

JOIN

JOIN

700,000

1

2

3

4

5

1

2

3

4

5

1

2

3

4

5

6

7

8

9

0

1

2

3

4

5

6

7

8

9

0

Card Sort: Large Numbers (4 to 6 digits)

Card Sort: Large Numbers

186,000

Card Sort: Large Numbers

375,000

Card Sort: Large Numbers

18,600

Card Sort: Large Numbers

37,500

Card Sort: Large Numbers

499,000

Card Sort: Large Numbers

3,750

Card Sort: Large Numbers

49,900

Card Sort: Large Numbers

1,860

Card Sort: Large Numbers

4,990

Card Sort: Diagrams of Fractions & Decimals

Card Sort: Diagrams of Fractions and Decimals

A

$$\frac{4}{10}$$

Card Sort: Diagrams of Fractions and Decimals

B

$$1\frac{40}{100}$$

Card Sort: Diagrams of Fractions and Decimals

C

$$0.14$$

Card Sort: Diagrams of Fractions and Decimals

D

$$1.40$$

Card Sort: Diagrams of Fractions and Decimals

E

$$1.4$$

Card Sort: Diagrams of Fractions and Decimals

F

$$0.40$$

Card Sort: Diagrams of Fractions and Decimals

G

$$\frac{4}{100}$$

Card Sort: Diagrams of Fractions and Decimals

H

$$\frac{14}{100}$$

Card Sort: Diagrams of Fractions & Decimals

Card Sort: Diagrams of Fractions and Decimals

I

0.04

Card Sort: Diagrams of Fractions and Decimals

J

0.4

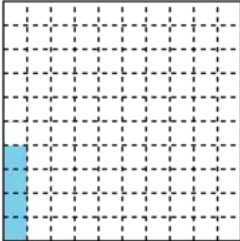
Card Sort: Diagrams of Fractions and Decimals

K

$\frac{40}{100}$

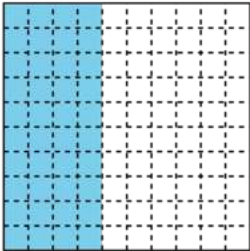
Card Sort: Diagrams of Fractions and Decimals

L



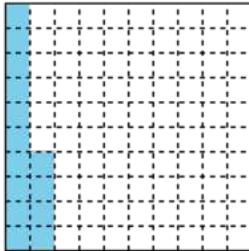
Card Sort: Diagrams of Fractions and Decimals

M



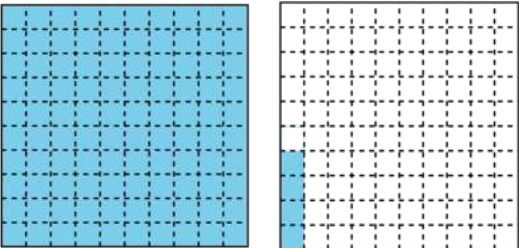
Card Sort: Diagrams of Fractions and Decimals

N



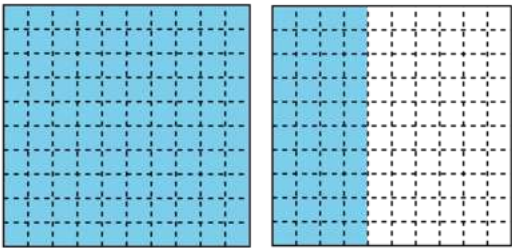
Card Sort: Diagrams of Fractions and Decimals

O



Card Sort: Diagrams of Fractions and Decimals

P



Order Once, Order Twice

Order Once, Order Twice

Set A

$$1\frac{6}{10}$$

Order Once, Order Twice

Set B

$$\frac{24}{100}$$

Order Once, Order Twice

Set A

$$1.06$$

Order Once, Order Twice

Set B

$$2.40$$

Order Once, Order Twice

Set A

$$\frac{116}{100}$$

Order Once, Order Twice

Set B

$$2.04$$

Order Once, Order Twice

Set A

$$2.6$$

Order Once, Order Twice

Set B

$$1\frac{4}{100}$$

Order Once, Order Twice

Set A

$$0.96$$

Order Once, Order Twice

Set B

$$1.24$$

Rolling for Fractions Stage 1 Recording Sheet

- Each partner:
 - Roll 6 number cubes. If you roll any fives, they count as a wild and can be any number you'd like.
 - See if you can fill in a statement to show equivalent fractions.
 - If you cannot make equivalent fractions, re-roll as many cubes as you'd like.
 - If you can make equivalent fractions, record your statement and show or explain how you know the fractions are equivalent. You get 1 point for each pair of equivalent fractions you write.
- Take turns. The partner who has the most points once the recording sheet is full wins the game.

$\frac{\square}{\square} = \frac{\square}{\square}$	$\frac{\square}{\square} = \frac{\square}{\square}$
$\frac{\square}{\square} = \frac{\square}{\square}$	$\frac{\square}{\square} = \frac{\square}{\square}$

Fraction Cards Grade 4

Fraction Cards Grade 4

$$\frac{1}{8}$$

Fraction Cards Grade 4

$$\frac{2}{8}$$

Fraction Cards Grade 4

$$\frac{3}{8}$$

Fraction Cards Grade 4

$$\frac{4}{8}$$

Fraction Cards Grade 4

$$\frac{5}{8}$$

Fraction Cards Grade 4

$$\frac{6}{8}$$

Fraction Cards Grade 4

$$\frac{7}{8}$$

Fraction Cards Grade 4

$$\frac{8}{8}$$

Fraction Cards Grade 4

Fraction Cards Grade 4

$$\frac{1}{5}$$

Fraction Cards Grade 4

$$\frac{2}{5}$$

Fraction Cards Grade 4

$$\frac{3}{5}$$

Fraction Cards Grade 4

$$\frac{4}{5}$$

Fraction Cards Grade 4

$$\frac{5}{5}$$

Fraction Cards Grade 4

$$\frac{6}{5}$$

Fraction Cards Grade 4

$$\frac{1}{10}$$

Fraction Cards Grade 4

$$\frac{2}{10}$$

Fraction Cards Grade 4

Fraction Cards Grade 4

$$\frac{3}{10}$$

Fraction Cards Grade 4

$$\frac{4}{10}$$

Fraction Cards Grade 4

$$\frac{5}{10}$$

Fraction Cards Grade 4

$$\frac{6}{10}$$

Fraction Cards Grade 4

$$\frac{7}{10}$$

Fraction Cards Grade 4

$$\frac{8}{10}$$

Fraction Cards Grade 4

$$\frac{9}{10}$$

Fraction Cards Grade 4

$$\frac{10}{10}$$

Fraction Cards Grade 4

Fraction Cards Grade 4

$$\frac{11}{10}$$

Fraction Cards Grade 4

$$\frac{19}{10}$$

Fraction Cards Grade 4

$$\frac{1}{12}$$

Fraction Cards Grade 4

$$\frac{3}{12}$$

Fraction Cards Grade 4

$$\frac{4}{12}$$

Fraction Cards Grade 4

$$\frac{7}{12}$$

Fraction Cards Grade 4

$$\frac{9}{12}$$

Fraction Cards Grade 4

$$\frac{10}{12}$$

Fraction Cards Grade 4

Fraction Cards Grade 4

$$\frac{13}{12}$$

Fraction Cards Grade 4

$$\frac{15}{12}$$

Fraction Cards Grade 4

$$\frac{1}{100}$$

Fraction Cards Grade 4

$$\frac{5}{100}$$

Fraction Cards Grade 4

$$\frac{10}{100}$$

Fraction Cards Grade 4

$$\frac{20}{100}$$

Fraction Cards Grade 4

$$\frac{49}{100}$$

Fraction Cards Grade 4

$$\frac{50}{100}$$

Fraction Cards Grade 4

Fraction Cards Grade 4

$$\frac{51}{100}$$

Fraction Cards Grade 4

$$\frac{75}{100}$$

Fraction Cards Grade 4

$$\frac{99}{100}$$

Fraction Cards Grade 4

$$\frac{200}{100}$$

Fraction Cards Grade 3

Fraction Cards Grade 3

$$\frac{1}{4}$$

Fraction Cards Grade 3

$$\frac{2}{4}$$

Fraction Cards Grade 3

$$\frac{3}{4}$$

Fraction Cards Grade 3

$$\frac{4}{4}$$

Fraction Cards Grade 3

$$\frac{5}{4}$$

Fraction Cards Grade 3

$$\frac{1}{6}$$

Fraction Cards Grade 3

$$\frac{2}{6}$$

Fraction Cards Grade 3

$$\frac{3}{6}$$

Fraction Cards Grade 3

Fraction Cards Grade 3

$$\frac{4}{6}$$

Fraction Cards Grade 3

$$\frac{5}{6}$$

Fraction Cards Grade 3

$$\frac{6}{6}$$

Fraction Cards Grade 3

$$\frac{7}{6}$$

Fraction Cards Grade 3

$$\frac{1}{2}$$

Fraction Cards Grade 3

$$\frac{2}{2}$$

Fraction Cards Grade 3

$$\frac{1}{3}$$

Fraction Cards Grade 3

$$\frac{2}{3}$$

Fraction Cards Grade 3

Fraction Cards Grade 3

$$\frac{3}{3}$$

Fraction Cards Grade 3

$$\frac{6}{3}$$

Fraction Cards Grade 3

$$\frac{4}{2}$$

Fraction Cards Grade 3

$$\frac{16}{6}$$

Fraction Cards Grade 3

$$\frac{6}{2}$$

Fraction Cards Grade 3

$$\frac{8}{2}$$

Fraction Cards Grade 3

$$\frac{5}{3}$$

Fraction Cards Grade 3

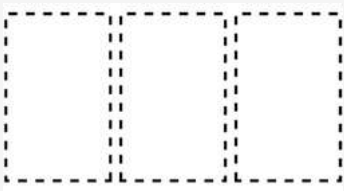
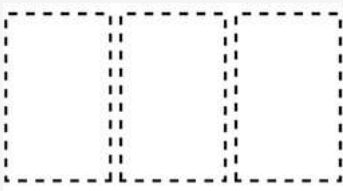
$$\frac{13}{4}$$

Greatest of Them All Stage 2 Recording Sheet

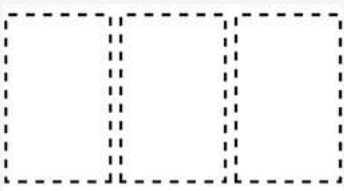
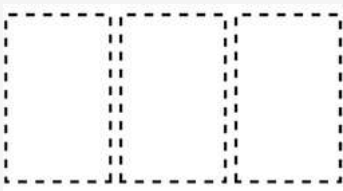
Directions:

- Partner A chooses a number card and writes the number in one of the blanks for Round 1.
- Partner B does the same.
- Repeat until each partner has a three-digit number.
- Write a comparison using $<$, $>$, or $=$.
- The partner with the greater number wins the round.

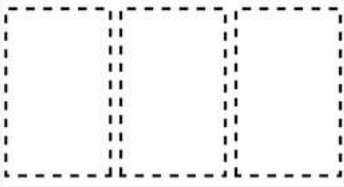

Round 1:

My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

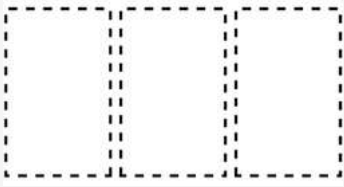

Round 2:

My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

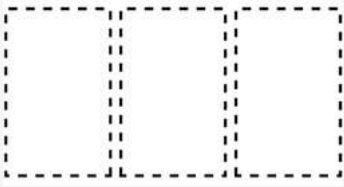

Round 3:

My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

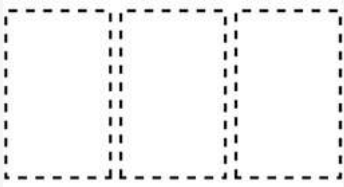

Round 4:

My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

Round 5:

My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

Round 6:

My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

Mystery Number Stage 4 Gameboard

Directions:

- Partner A:
 - Pick a number on the game board. Don't tell your partner!
 - Give your partner a clue about your mystery number. You can use the vocabulary below to help you give clues, or make up your own.
- Partner B:
 - Guess your partner's mystery number.
- If Partner B guesses the mystery number, switch roles.
- If Partner B does not guess the mystery number, Partner A gives another clue. Go back and forth guessing the number and giving clues until Partner B guesses the mystery number.

Vocabulary:

numerator, denominator, greater than 1, less than 1, equivalent, factor, multiple, prime, composite, odd, even

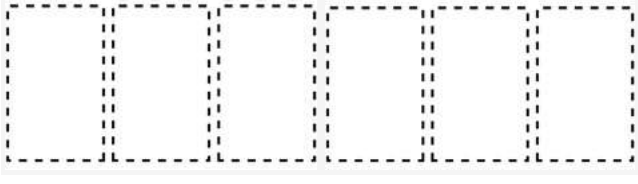
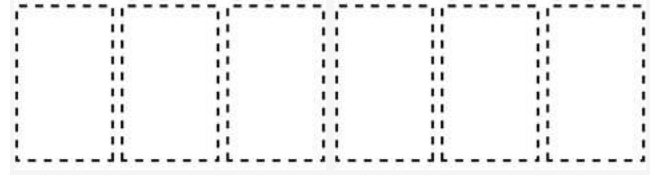
$\frac{1}{100}$	$\frac{3}{8}$	$\frac{105}{100}$	$\frac{132}{12}$
$\frac{2}{8}$	$\frac{5}{5}$	$\frac{42}{100}$	$\frac{15}{8}$
$\frac{16}{10}$	$\frac{100}{10}$	$\frac{16}{100}$	$\frac{18}{8}$
$\frac{11}{12}$	$\frac{4}{8}$	$\frac{2}{12}$	$\frac{45}{8}$
$\frac{13}{5}$	$\frac{15}{10}$	$\frac{60}{100}$	$\frac{9}{8}$

Greatest of Them All Stage 3 Recording Sheet

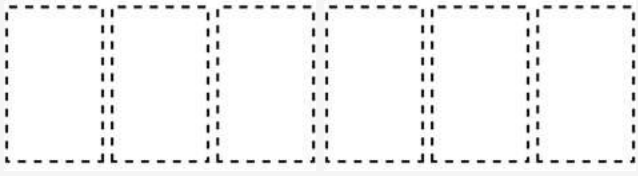
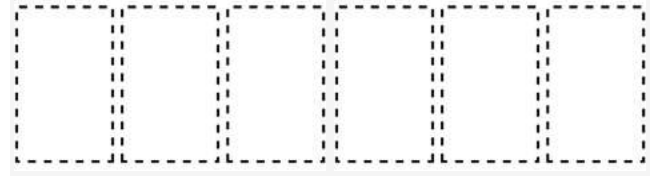
Directions:

- Partner A chooses a number card and writes the number in one of the blanks for Round 1.
- Partner B does the same.
- Repeat until each partner has a six-digit number.
- Write a comparison using $<$, $>$, or $=$.
- The partner with the greater number wins the round.

Round 1:



My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

Round 2:

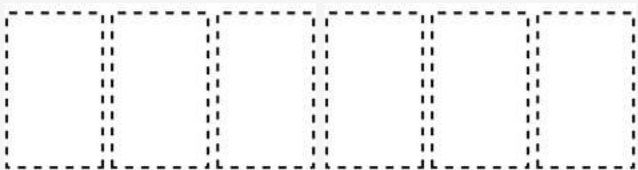
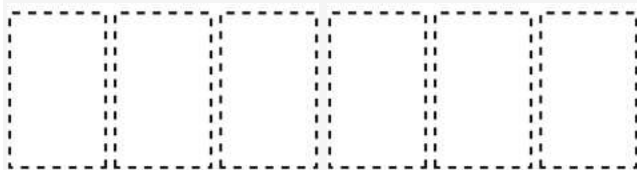
My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

Greatest of Them All Stage 3 Recording Sheet

Round 3:



My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

Round 4:

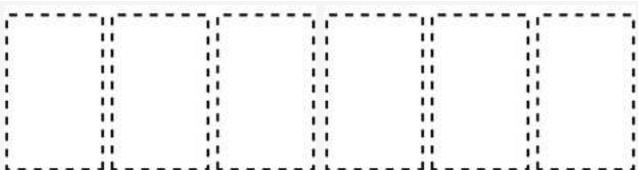
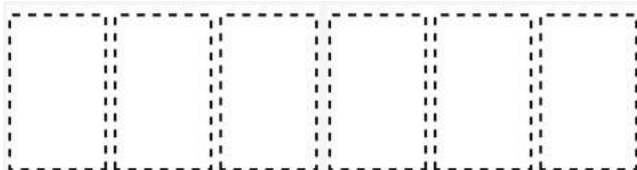
My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

Greatest of Them All Stage 3 Recording Sheet

Round 5:

My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

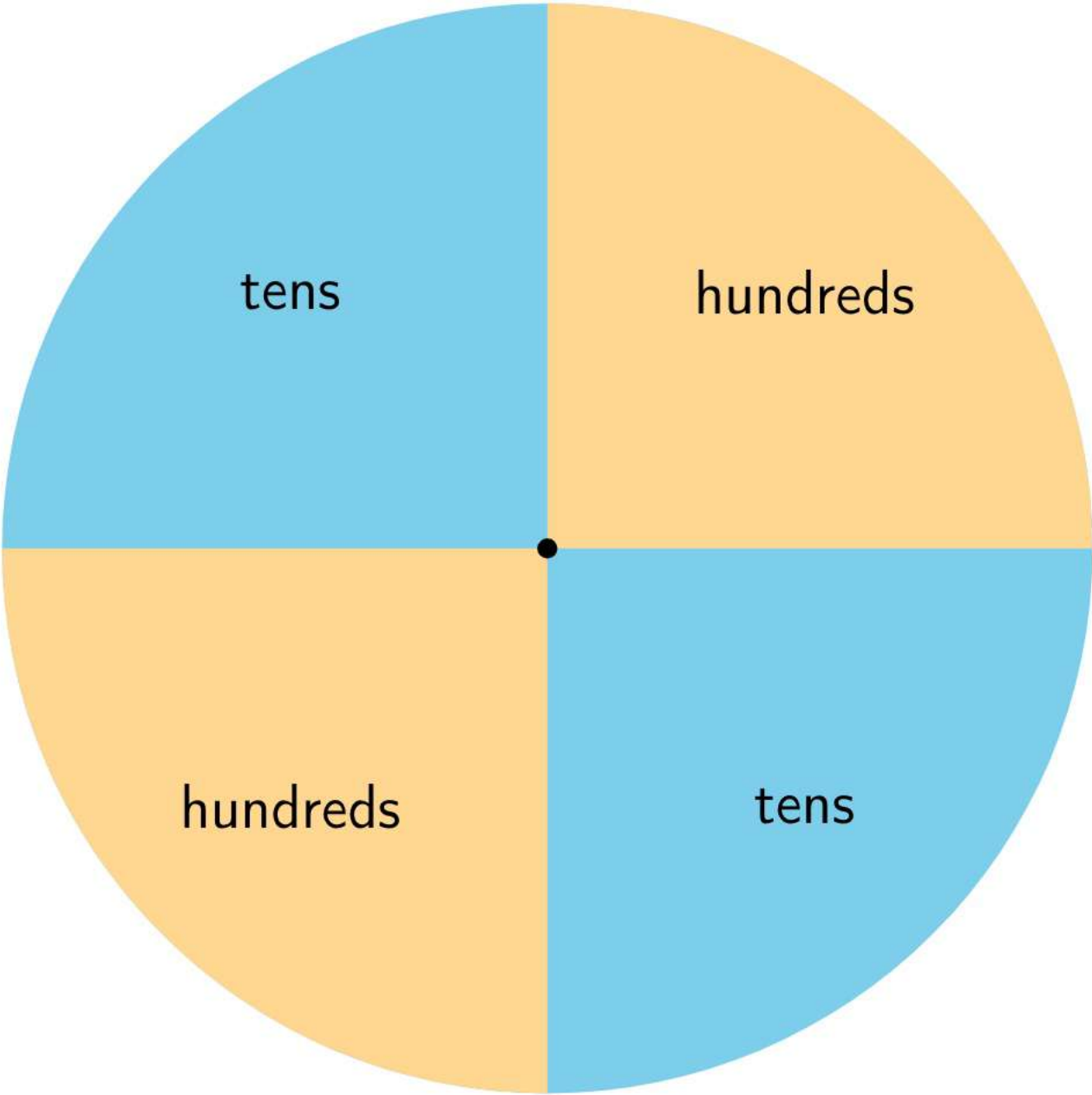
Round 6:

My Number	My Partner's Number
	
Compare using $<$, $>$, or $=$.	

Tic Tac Round Stage 1 Gameboard

Directions:

- Each partner:
 - Pick 3 cards and create a three-digit number.
 - Spin the spinner and round to that place.
 - Record the rounded number in any empty box.
- Take turns. The first player to fill 3 boxes in a row wins.



Mystery Number Stage 5 Gameboard

Directions:

- Partner A:
 - Pick a number on the game board. Don't tell your partner!
 - Give your partner a clue about your mystery number. You can use the vocabulary below to help you give clues, or make up your own.
- Partner B:
 - Guess your partner's mystery number.
- If Partner B guesses the mystery number, switch roles.
- If Partner B does not guess the mystery number, Partner A gives another clue. Go back and forth guessing the number and giving clues until Partner B guesses the mystery number.

Vocabulary:

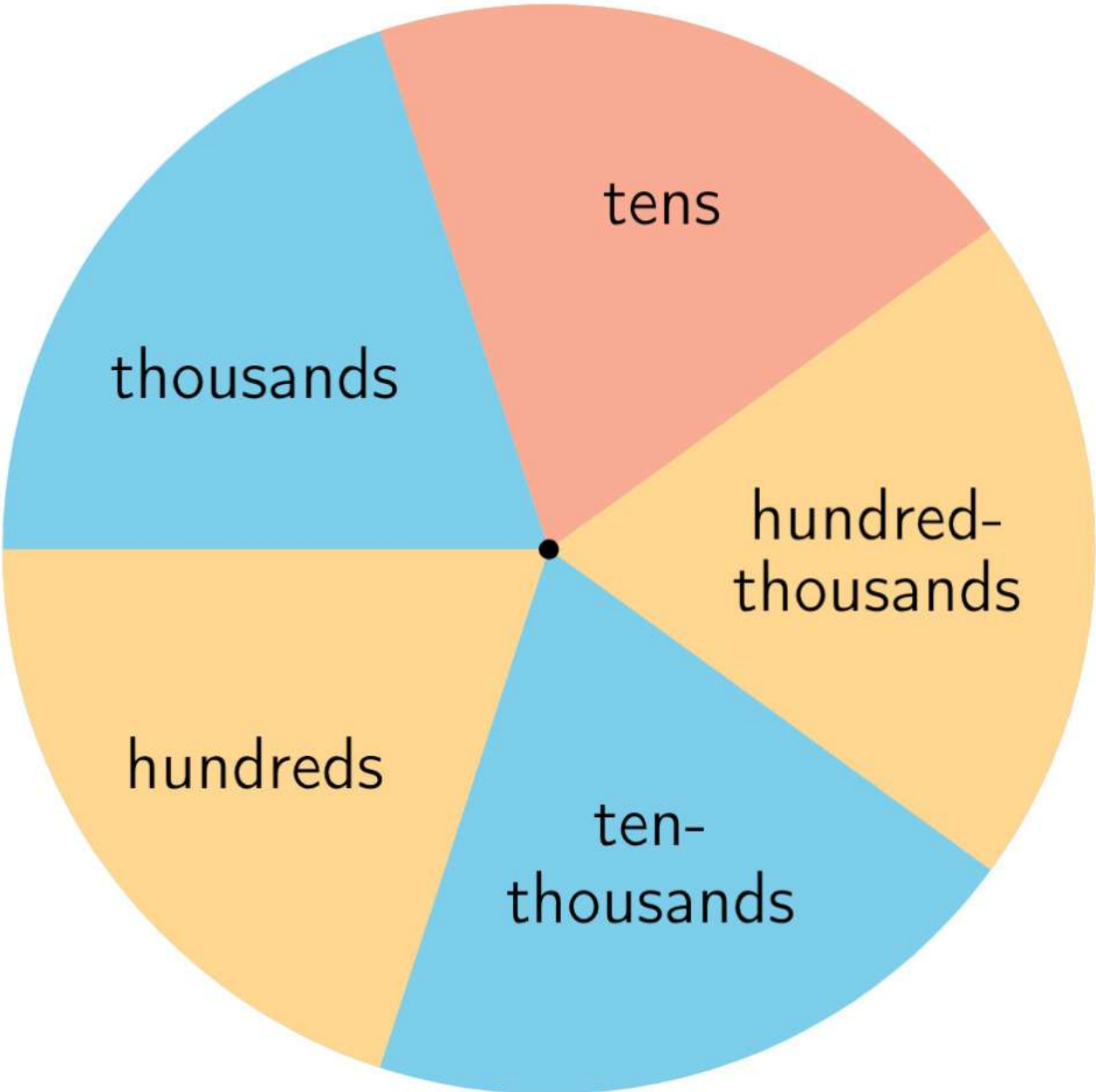
ones, tens, hundreds, thousands, ten-thousands, hundred-thousands, greater than, less than, between, 10 times as much, multiple, factor

505,505	23,849	329,192	878,830
7,404	63,053	149,834	2,139
38,513	262,987	6,535	784,936
409,281	919,675	603,146	56,350
31,452	8,493	591,230	334,621
2,958	457,592	137,004	98,670
89,067	72,540	3,587	154,239
753,402	662,193	376	982,415
123,456	1,938	158,678	21,109
873,751	43,820	999,999	6,537

Tic Tac Round Stage 2 Gameboard

Directions:

- Each partner:
 - Pick 6 cards and create a six-digit number.
 - Spin the spinner and round to that place.
 - Record the rounded number in any empty box.
- Take turns. The first player to fill 3 boxes in a row wins.



Puzzle 1

Fill in digits to make each equation true.

For each equation, you may only use each digit (0-9) once.

$$\boxed{1} \boxed{7} \boxed{8} \boxed{} + \boxed{6} \boxed{2} \boxed{1} \boxed{} = 8,000$$

$$\boxed{} \boxed{7} \boxed{3} \boxed{1} + \boxed{3} \boxed{7} \boxed{1} \boxed{} = 8,446$$

$$\boxed{} \boxed{2} \boxed{1} \boxed{} - 1,541 = 1,676$$

$$\boxed{2} \boxed{0} \boxed{0} \boxed{} + \boxed{} \boxed{7} \boxed{3} \boxed{5} = 4,735$$

$$\boxed{} \boxed{0} \boxed{0} \boxed{0} - 1,789 = \boxed{} \boxed{2} \boxed{1} \boxed{1}$$

Puzzle 2

Fill in digits to make each equation true.

For each equation, you may only use each digit (0-9) once.

$$\boxed{3} \boxed{7} \boxed{9} \boxed{} + 1,207 = \boxed{} \boxed{} \boxed{} \boxed{}$$

$$\boxed{2} \boxed{} \boxed{} \boxed{1} \boxed{2} + \boxed{4} \boxed{} \boxed{} \boxed{3} \boxed{0} = 6,842$$

$$\boxed{1} \boxed{0} \boxed{} \boxed{} \boxed{1} + \boxed{} \boxed{} \boxed{0} \boxed{0} \boxed{7} = 8,008$$

$$\boxed{} \boxed{2} \boxed{0} \boxed{0} \boxed{1} - \boxed{5} \boxed{2} \boxed{0} \boxed{} = 3,000$$

$$\boxed{} \boxed{} \boxed{} \boxed{3} \boxed{2} - 1,332 = 3,600$$

Puzzle 3

Fill in digits to make each equation true.

For each equation, you may only use each digit (0-9) once.

$$5,000 - \square\square 21\square\square = 1,783$$

$$\square\square 25\square\square + 3,241 = 4,500$$

$$4\square\square 10 - 14\square\square 1 = 3,349$$

$$232\square\square + \square\square 675 = 7,000$$

$$3\square\square 00 + 450\square\square = 7,700$$

Puzzle 4

Fill in digits to make each equation true.

For each equation, you may only use each digit (0-9) once.

$$\begin{array}{cccccccc} \boxed{2} & \boxed{} & \boxed{} & \boxed{0} & \boxed{2} & + & \boxed{3} & \boxed{0} & \boxed{0} & \boxed{0} & \boxed{} & = & 5,005 \end{array}$$

$$\begin{array}{cccccccc} \boxed{8} & \boxed{} & \boxed{} & \boxed{3} & \boxed{1} & - & \boxed{7} & \boxed{} & \boxed{} & \boxed{2} & \boxed{0} & = & 1,111 \end{array}$$

$$\begin{array}{cccccccc} \boxed{} & \boxed{3} & \boxed{5} & \boxed{2} & + & \boxed{} & \boxed{4} & \boxed{2} & \boxed{6} & = & 5,778 \end{array}$$

$$\begin{array}{cccccccc} \boxed{} & \boxed{3} & \boxed{0} & \boxed{2} & - & \boxed{4} & \boxed{3} & \boxed{0} & \boxed{} & = & 1,000 \end{array}$$

$$\begin{array}{cccccccc} \boxed{1} & \boxed{} & \boxed{} & \boxed{1} & \boxed{0} & + & 7,200 & = & \boxed{} & \boxed{} & \boxed{0} & \boxed{1} & \boxed{0} \end{array}$$

Credits

CKMath K–8 was originally developed by Open Up Resources and authored by Illustrative Mathematics, <https://www.illustrativemathematics.org>, and is copyrighted as 2017–2019 by Open Up Resources. It is licensed under the Creative Commons Attribution 4.0 International License (CC BY 4.0). The Open Up Resources K–8 Math Curriculum is available at: <https://www.openupresources.org/math-curriculum/>.

Adaptations and updates to the IM K–8 Math English language learner supports are copyright 2019 by Open Up Resources and licensed under the Creative Commons Attribution 4.0 International License (CC BY 4.0),

Adaptations and updates to IM K–8 Math are copyright 2019 by Illustrative Mathematics, including the additional English assessments marked as "B", and the Spanish translation of assessments marked as "B". These adaptations and updates are licensed under the Creative Commons Attribution 4.0 International License (CC BY 4.0).

This particular work is based on additional work of the Core Knowledge® Foundation (www.coreknowledge.org) made available through licensing under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

Illustration and Photo Credits

Artisticco LLC / Alamy Stock Vector: Cover B

Illustrative Math K–8 / Cover Image, all interior illustrations, diagrams, and pictures / Copyright 2019 / Licensed under the Creative Commons Attribution 4.0 International License (CC BY 4.0).

These materials include public domain images or openly licensed images that are copyrighted by their respective owners, unless otherwise noted/credited. Openly licensed images remain under the terms of their respective licenses.



CKMath™
Core Knowledge **MATHEMATICS™**

CKMath™
Core Knowledge MATHEMATICS™

A comprehensive program for mathematical skills and concepts
as specified in the **Core Knowledge Sequence**
(content and skill guidelines for Grades K–8).

Core Knowledge MATHEMATICS™
units at this level include:

Factors and Multiples
Fraction Equivalence and Comparison
Extending Operations to Fractions
From Hundredths to Hundred-thousands
Multiplicative Comparison and Measurement
Multiplying and Dividing Multi-digit Numbers
Angles and Angle Measurement
Properties of Two-dimensional Shapes
Putting it All Together

www.coreknowledge.org

Core Knowledge Curriculum Series™