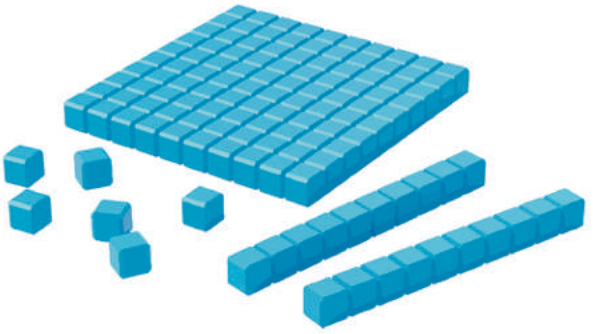
Core Knowledge® MATHEMATICS

Wrapping Up Addition and Subtraction Within 1,000



Teacher Guide

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Wrapping Up Addition and Subtraction Within 1,000

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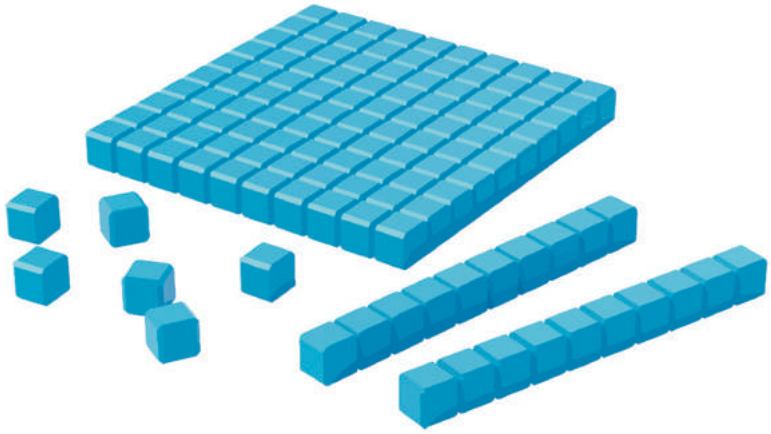


Wrapping Up Addition and Subtraction Within 1,000

Teacher Guide

Core Knowledge Mathematics™

Unit 3: Wrapping Up Addition and Subtraction within 1,000

At a Glance

Unit 3 is estimated to be completed in 22-23 days including 2 days for assessment.

This unit is divided into four sections including 20 lessons and 1 optional lesson.

- Section A—Add Within 1,000 (Lessons 1-6)
- Section B—Subtract Within 1,000 (Lessons 7-12)
- Section C—Round Within 1,000 (Lessons 13-16)
- Section D—Solve Two-Step Problems (Lessons 17-21)

On pages 7-8 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 eight student centers.

- Target Numbers
- Five in a Row: Addition and Subtraction
- Rectangle Rumble
- How Close?
- Number Puzzles: Addition and Subtraction
- Five in a Row: Multiplication
- Capture Squares
- Tic Tac Round

Unit 3: Wrapping Up Addition and Subtraction Within 1,000

Unit Learning Goals

- Students use place value understanding to round whole numbers and add and subtract within 1,000. They also represent and solve two-step word problems using addition, subtraction, and multiplication and assess the reasonableness of answers.

In this unit, students work toward the goal of fluently adding and subtracting within 1,000. They use mental math strategies developed in grade 2 and learn algorithms based on place value.

In grade 2, students added and subtracted within 1,000 using strategies based on place value, properties of operations, and the relationship between addition and subtraction. When students combine hundreds, tens, and ones, they use place value understanding. When they decompose numbers to add or subtract, they rely on the commutative and associative properties. When students count up to subtract, they use the relationship between addition and subtraction.

To move toward fluency, students learn a few different algorithms that work with any numbers and are generalizable to larger numbers and decimals. Students work with a variety of algorithms, starting with those that show expanded form, and moving toward algorithms that are more streamlined and closer to the standard algorithm.

$$\begin{array}{rrrrrr} & 300 & + & 30 & + & 7 \\ + & 200 & + & 30 & + & 6 \\ \hline & 500 & + & 60 & + & 13 \end{array}$$

$$\begin{array}{rrrrrr} & & & 60 & & 13 \\ & 500 & + & \cancel{70} & + & \cancel{3} \\ - & 200 & + & 30 & + & 6 \\ \hline & 300 & + & 30 & + & 7 \end{array}$$

Students explore various algorithms but are not required to use a specific one. They should, however, move from strategy-based work of grade 2 to algorithm-based work to set the stage for using the standard algorithm in grade 4. If students begin the unit with knowledge of the standard algorithm, it is still important for them to make sense of the place-value basis of the algorithm.

Understanding of place value also comes into play as students round numbers to the nearest multiple of 10 and 100. Students do not need to know a formal definition of “multiples” until grade 4. At this point, it is enough to recognize that a multiple of 10 is a number called out when counting by 10, or the total in a whole-number of tens (such as 8 tens). Likewise, a multiple of 100 is a number called out when counting by 100, or the total in a whole-number of hundreds (such as 6 hundreds). Students use rounding to estimate answers to two-step problems and determine if answers are reasonable.

Section A: Add Within 1,000

Standards Alignments

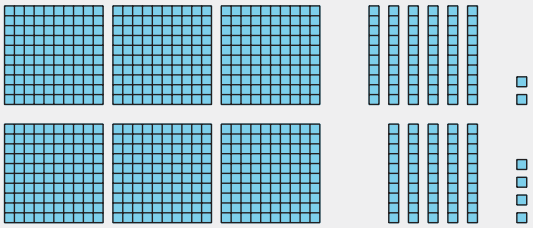
Building On	2.NBT.A.1, 2.NBT.A.3, 2.NBT.B.7
Addressing	3.NBT.A.2, 3.OA.D.9
Building Towards	3.NBT.A.2

Section Learning Goals

- Fluently add within 1,000 using algorithms based on place value and properties of operations.
- Use place value understanding to compose and decompose numbers.

Students begin this section by revisiting the idea of place value, reasoning about different ways to decompose numbers within 1,000, and using familiar strategies from grade 2 to add and subtract within 1,000.

From there, they progress toward more abstract addition strategies, but ones that are still based on place value. To support this progression toward algorithms, students use base-ten blocks or diagrams, express numbers in expanded form, and rely on their understanding of properties of operations. For example, here are three ways to add $362 + 354$:



$$\begin{array}{rr} & 300 + 60 + 2 \\ + & 300 + 50 + 4 \\ \hline & 600 + 110 + 6 \end{array}$$

$$\begin{array}{rr} & 3\ 6\ 2 \\ + & 3\ 5\ 4 \\ \hline & \quad\ \ 6 \\ & 1\ 1\ 0 \\ + & 6\ 0\ 0 \\ \hline & 7\ 1\ 6 \end{array}$$

Students look for and make use of structure as they relate the compositions of numbers, expressions, and base-ten blocks or diagrams to find sums and differences (MP7).

PLC: Lesson 4, Activity 1, What is an Algorithm?

Suggested Centers

- Target Numbers (1–5), Stage 6: Add Hundreds, Tens, or Ones (Addressing)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Addressing)
- Rectangle Rumble (3–5), Stage 2: Factors 1–5 (Supporting)

Section B: Subtract Within 1,000

Standards Alignments

Building On	2.NBT.B.7
Addressing	3.NBT.A.2, 3.OA.B.5
Building Towards	3.NBT.A.2, 3.OA.C.7

Section Learning Goals

- Fluently subtract within 1,000 using algorithms based on place value, properties of operations, and the relationship between addition and subtraction.

In this section, students analyze and use subtraction algorithms. They begin by using base-ten blocks and diagrams to subtract numbers. Because it is difficult to record regrouping using drawings, however, they see algorithms as a helpful way to find differences.

As is the case with addition, students first make sense of a subtraction algorithm that uses expanded form, which allows them to see how the hundreds and tens are decomposed into smaller units.

$$\begin{array}{rrrrrr} & 400 & & 120 & & \\ & \cancel{500} & + & \cancel{20} & + & 8 \\ - & 200 & + & 70 & + & 1 \\ \hline \end{array}$$

This non-conventional notation allows students to see the meaning behind the digits used above the numbers in the standard algorithm.

$$\begin{array}{rrrr} & 4 & 12 & \\ & \cancel{5} & \cancel{2} & 8 \\ - & 2 & 7 & 1 \\ \hline \end{array}$$

PLC: Lesson 10, Activity 1, A New Subtraction Algorithm

Suggested Centers

- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)
- Five in a Row: Multiplication (3–5), Stage 2: Factors 1–9 (Supporting)

Section C: Round Within 1,000

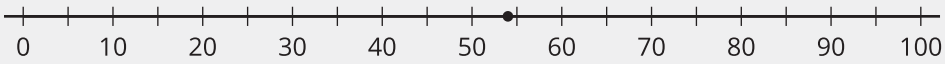
Standards Alignments

Building On	2.NBT.B.8
Addressing	3.NBT.A.1, 3.OA.C.7
Building Towards	3.NBT.A.1

Section Learning Goals

- Round whole numbers to the nearest multiple of 10 and 100.

In this section, students learn the conventions of rounding whole numbers to the nearest multiple of 10 or 100. This work relies on and reinforces their understanding of place value. Number line diagrams are used to help students think about the multiple of 10 or 100 to which a given number is closest.



Students learn that when we find the nearest multiple of 10 or 100, we are rounding "to the nearest ten" or rounding "to the nearest hundred." They also see that rounding a number to the nearest ten and nearest hundred can produce the same result.

Students explore how rounding to the nearest ten or hundred can change the estimate of a sum. This prepares them to use rounding to see if solutions to problems are reasonable in the next section.

PLC: Lesson 13, Activity 2, Close to Multiples of 100

Suggested Centers

- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Addressing)
- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)
- Capture Squares (1–3), Stage 6: Multiply with 1–5 (Supporting)

Section D: Solve Two-Step Problems

Standards Alignments

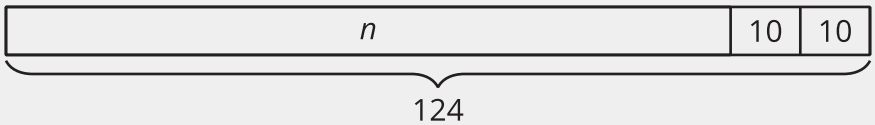
Addressing	3.NBT.A.1, 3.NBT.A.2, 3.OA.C.7, 3.OA.D.8
Building Towards	3.NBT.A.1, 3.NBT.A.2, 3.OA.D.8, 3.OA.D.9

Section Learning Goals

- Assess the reasonableness of answers.
- Solve two-step word problems using addition, subtraction, and multiplication.

In this section, students encounter more complex problems, think about the reasonableness of their answers, and use rounding to make estimates.

Students analyze tape diagrams that could represent the relationships in given situations and write corresponding equations to represent them. Previously, they worked with diagrams and equations with a ? or ___ to represent an unknown. Now, students interpret and write letters to stand for an unknown number.



$$124 - (2 \times 10) = n$$

Finally, students apply what they've learned about adding and subtracting within 1,000 to solve two-step word problems that involve multiplication, addition, and subtraction.

PLC: Lesson 17, Activity 2, Solve and Reason

Suggested Centers

- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)
- Five in a Row: Multiplication (3–5), Stage 2: Factors 1–9 (Supporting)

Throughout the Unit

In the first part of the unit, the focus of the warm-ups is on the use of place value to support the work with addition and subtraction. Students use strategies based on place value and properties of

operations to add and subtract within 1,000.

Later in the unit, students come back to multiplication and build on the work of multiplying by 2, 5, and 10. Students apply properties of operations as strategies to multiply and represent these strategies using visual representations and expressions. This work prepares students to solve two-step word problems using addition, subtraction, and multiplication at the end of the unit.

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

lesson 3	lesson 8	lesson 12
$200 + 40 + 7$	$400 - 200$	2×6
$50 + 300 + 2$	$450 - 200$	3×6
$40 + 600 + 12$	$450 - 205$	2×7
$500 + 7 + 130$	$450 - 215$	3×7

Materials Needed

LESSON	GATHER	COPY
A.1	• Base-ten blocks	• Card Sort: Numbers in Their Different Forms (groups of 2) • Numbers in Different Forms Round Table (groups of 1)
A.2	• Base-ten blocks	• none
A.3	• Base-ten blocks	• none
A.4	• Base-ten blocks	• none
A.5	• none	• none
A.6	• none	• none
B.7	• Base-ten blocks • Tools for creating a visual display	• none
B.8	• none	• Diagrams and Algorithms (groups of 2)
B.9	• Base-ten blocks	• none
B.10	• Base-ten blocks	• none
B.11	• none	• none
B.12	• Paper clips • Pencils	• Greatest Difference, Smallest Difference (groups of 2)
C.13	• none	• none
C.14	• none	• none
C.15	• none	• none
C.16	• Index cards	• none

D.17	• none	• none
D.18	• Sticky notes • Tools for creating a visual display	• Card Sort: Situations, Equations, and Diagrams (groups of 4)
D.19	• none	• none
D.20	• none	• Info Gap: Bake Sale (groups of 2)
D.21	• none	• none

Center: Target Numbers (1–5)

Stage 6: Add Hundreds, Tens, or Ones

Lessons

- Grade3.3.A1 (addressing)
- Grade3.3.A2 (addressing)
- Grade3.3.A3 (addressing)
- Grade3.3.A4 (addressing)
- Grade3.3.A5 (addressing)
- Grade3.3.A6 (addressing)

Stage Narrative

Students add hundreds, tens, and ones to get as close to 1,000 as possible. Students start by rolling three number cubes to get a starting number. Then, they take turns rolling the three cubes to create a number to add. For each number they roll, they choose whether they want it to represent hundreds, tens, or ones. Students add their hundreds, tens, and ones to the starting number. The sum becomes the first addend in the next round. The player who gets closest to 1,000 in 6 rounds, without going over, is the winner.

Standards Alignments

Addressing 2.NBT.B.7, 2.NBT.B.8, 3.NBT.A.2

Materials to Gather

Number cubes

Materials to Copy

Target Numbers Stage 6 Recording Sheet (groups of 1)

Additional Information

Each group of 2 needs three number cubes.

Stage 7: Subtract Hundreds, Tens, or Ones

Lessons

- Grade3.3.C13 (addressing)
- Grade3.3.C14 (addressing)
- Grade3.3.C15 (addressing)
- Grade3.3.C16 (addressing)

Stage Narrative

Students subtract hundreds, tens, and ones to get as close to 0 as possible. Students start their first equation with 1,000 and take turns rolling three cubes to get a number to subtract. For each number they roll, they choose whether they want it to represent hundreds, tens, or ones. Students subtract their hundreds, tens, and ones from the starting number. The difference becomes the first number in the next equation. The player who gets closest to 0 in 6 rounds, without going below 0, is the winner.

Standards Alignments

Addressing 2.NBT.B.7, 2.NBT.B.8, 3.NBT.A.2

Materials to Gather

Number cubes

Materials to Copy

Target Numbers Stage 7 Recording Sheet (groups of 1)

Additional Information

Each group of 2 needs three number cubes.

Stages used in Grade 2

Stage 3

Addressing

- Grade2.9.B

Stage 4

Addressing

- Grade2.2.B
- Grade2.2.C
- Grade2.9.B

Stage 5

Addressing

- Grade2.2.B
- Grade2.2.C
- Grade2.3.A
- Grade2.9.B

Supporting

- Grade2.7.C

Stage 6

Addressing

- Grade2.7.C

Supporting

- Grade2.8.A
- Grade2.8.B

Stage 7

Addressing

- Grade2.7.C

Supporting

- Grade2.8.A
- Grade2.8.B

Center: Five in a Row: Addition and Subtraction (1–2)

Stage 8: Add within 1,000 with Composing

Lessons

- Grade3.3.A1 (addressing)
- Grade3.3.A2 (addressing)
- Grade3.3.A3 (addressing)
- Grade3.3.A4 (addressing)
- Grade3.3.A5 (addressing)
- Grade3.3.A6 (addressing)

Stage Narrative

Partner A chooses two numbers and places a paper clip on each number. They add the numbers and place a counter on the sum. Partner B moves one of the paper clips to a different number, adds the numbers, and places a counter on the sum. Students take turns moving one paper clip, finding the sum, and covering it with a counter.

Standards Alignments

Addressing 2.NBT.B.7

Materials to Gather

Paper clips, Two-color counters

Materials to Copy

Five in a Row Addition and Subtraction Stage 8 Gameboard (groups of 2)

Additional Information

Each group of 2 needs 25 counters and 2 paper clips.

Stages used in Grade 2

Stage 5

Supporting

- Grade2.2.A

Stage 6

Addressing

- Grade2.2.A
- Grade2.2.B
- Grade2.9.B

Supporting

- Grade2.2.C
- Grade2.3.A
- Grade2.4.A
- Grade2.7.A

Stage 7

Addressing

- Grade2.7.A
- Grade2.7.B
- Grade2.7.C

Supporting

- Grade2.8.A
- Grade2.8.B

Stage 8

Addressing

- Grade2.7.B
- Grade2.7.C

Supporting

- Grade2.8.A
- Grade2.8.B

Center: Rectangle Rumble (3–5)

Stage 2: Factors 1–5

Lessons

- Grade3.3.A2 (supporting)
- Grade3.3.A3 (supporting)
- Grade3.3.A4 (supporting)
- Grade3.3.A5 (supporting)
- Grade3.3.A6 (supporting)

Stage Narrative

Students generate factors with a number cube and a spinner with the numbers 1–5. Students use a 15×15 grid.

Standards Alignments

Addressing 3.MD.C.7

Materials to Gather

Colored pencils, crayons, or markers, Number cubes, Paper clips

Materials to Copy

Rectangle Rumble Stage 2 Grid (groups of 2), Rectangle Rumble Stage 2 Spinner (groups of 2)

Additional Information

Each group of students need a paper clip, a number cube, and two different color writing utensils.

Center: How Close? (1–5)

Stage 4: Add to 1,000

Lessons

- Grade3.3.B7 (addressing)
- Grade3.3.B8 (addressing)
- Grade3.3.B9 (addressing)
- Grade3.3.B10 (addressing)
- Grade3.3.B11 (addressing)
- Grade3.3.B12 (addressing)
- Grade3.3.C13 (addressing)
- Grade3.3.C14 (addressing)
- Grade3.3.C15 (addressing)
- Grade3.3.C16 (addressing)

Stage Narrative

Before playing, students remove the cards that show 10 and set them aside.

Each student picks 8 cards and chooses 6 of them to create 2 three-digit numbers. Each student adds the numbers. The score for the round is the difference between each student's sum and 1,000. Students pick new cards so that they have 8 cards in their hand and then start the next round. The player with the lowest score wins.

This center stage is the first time Number Cards 0–10 are used in Grade 3, so they are provided as a Instructional master. Students will continue to use these throughout the year. Consider copying them on cardstock or laminating them and keeping them organized to be used repeatedly.

Standards Alignments

Addressing 2.NBT.B.7, 3.NBT.A.2

Materials to Copy

How Close? Stage 4 Recording Sheet (groups of 1), Number Cards (0-10) (groups of 2)

Stages used in Grade 2

Stage 1

Addressing

- Grade2.1.A
- Grade2.1.B
- Grade2.1.C

Stage 2

Addressing

- Grade2.1.A
- Grade2.1.B
- Grade2.1.C

Stage 3

Addressing

- Grade2.1.A
- Grade2.1.B
- Grade2.1.C

Supporting

- Grade2.4.A
- Grade2.4.B
- Grade2.7.A
- Grade2.7.B

Stage 4

Addressing

- Grade2.7.B
- Grade2.7.C

Supporting

- Grade2.8.A
- Grade2.8.B

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

Stage 5: Within 1,000

Lessons

- Grade3.3.B7 (addressing)
- Grade3.3.B8 (addressing)
- Grade3.3.B9 (addressing)
- Grade3.3.B10 (addressing)
- Grade3.3.B11 (addressing)
- Grade3.3.B12 (addressing)
- Grade3.3.D17 (addressing)
- Grade3.3.D18 (addressing)
- Grade3.3.D19 (addressing)
- Grade3.3.D20 (addressing)
- Grade3.3.D21 (addressing)
- Grade3.3.B12 (supporting)

Stage Narrative

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

Standards Alignments

Addressing 3.NBT.A.2

Materials to Copy

Number Puzzles Addition and Subtraction Stage 5 Recording Sheet (groups of 2)

Stages used in Grade 2

Stage 1

Addressing

- Grade2.1.A
- Grade2.1.B
- Grade2.1.C

Supporting

- Grade2.1.A

Stage 2

Addressing

- Grade2.1.A
- Grade2.1.B
- Grade2.1.C
- Grade2.3.C

Supporting

- Grade2.5.A
- Grade2.6.C

Stage 3

Addressing

- Grade2.3.C

Supporting

- Grade2.5.A
- Grade2.6.C

Stage 4

Addressing

- Grade2.3.B
- Grade2.3.C
- Grade2.4.B

Supporting

- Grade2.4.A
- Grade2.5.A
- Grade2.6.C
- Grade2.7.B
- Grade2.7.C

Center: Five in a Row: Multiplication (3–5)

Stage 2: Factors 1–9

Lessons

- Grade3.3.B8 (supporting)
- Grade3.3.B9 (supporting)
- Grade3.3.B10 (supporting)
- Grade3.3.B11 (supporting)
- Grade3.3.D18 (supporting)
- Grade3.3.D19 (supporting)
- Grade3.3.D20 (supporting)
- Grade3.3.D21 (supporting)

Stage Narrative

Students multiply using factors of 1–9. Partner A chooses two numbers and places a paper clip on each number. They multiply the numbers and place a counter on the product. Partner B moves one of the paper clips to a different number, multiplies the numbers, and places a counter on the product. Students take turns moving one paper clip, finding the product, and covering it with a counter.

Standards Alignments

Addressing 3.OA.C.7

Materials to Gather

Paper clips, Two-color counters

Materials to Copy

Five in a Row Multiplication and Division Stage 2 Gameboard (groups of 2)

Additional Information

Each group of 2 needs 25 two-color counters and 2 paper clips.

Center: Capture Squares (1–3)

Stage 6: Multiply with 1–5

Lessons

- Grade3.3.C14 (supporting)
- Grade3.3.C15 (supporting)
- Grade3.3.C16 (supporting)

Stage Narrative

Students roll a number cube and spin a spinner and find the product of the two numbers they generated. The spinner has numbers 2–5.

Standards Alignments

Addressing 3.OA.C.7

Materials to Gather

Colored pencils or crayons, Number cubes, Paper clips

Materials to Copy

Capture Squares Stage 6 Gameboard (groups of 2), Capture Squares Stage 6 Spinner (groups of 2)

Additional Information

Each group of 2 needs one number cube.

Stages used in Grade 2

Stage 1

Supporting

- Grade2.2.A

Stage 2

Supporting

- Grade2.2.A

Stage 3

Addressing

- Grade2.2.A
- Grade2.2.B
- Grade2.2.C

Supporting

- Grade2.4.A
- Grade2.6.C

Stage 4

Addressing

- Grade2.2.B
- Grade2.2.C

Supporting

- Grade2.3.B
- Grade2.4.A
- Grade2.6.C

Center: Tic Tac Round (3–5)

Stage 1: Nearest Ten or Hundred

Lessons

- Grade3.3.D17 (addressing)
- Grade3.3.D18 (addressing)
- Grade3.3.D19 (addressing)
- Grade3.3.D20 (addressing)
- Grade3.3.D21 (addressing)

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)

Section A: Add Within 1,000

Lesson 1: Represent Numbers in Different Ways

Standards Alignments

Building On	2.NBT.A.1, 2.NBT.A.3
Building Towards	3.NBT.A.2

Teacher-facing Learning Goals

- Represent numbers to 1,000 in different ways using place value understanding.

Student-facing Learning Goals

- Let's represent numbers in different ways.

Lesson Purpose

The purpose of this lesson is for students to represent numbers using base-ten blocks, base-ten diagrams, expanded form, numerals, and word form.

Prior to this grade, students represented numbers within 1,000 using number names, base-ten blocks and diagrams, and expanded form. They used place value to compose and decompose numbers within 1,000.

In this lesson, students revisit these familiar representations and ways of reasoning about numbers as they work to build fluency with addition and subtraction within 1,000. The base-ten diagrams and the expanded form will continue to be used to support students throughout this unit. Give students access to base-ten blocks, in case requested.

Access for:

Students with Disabilities

- Engagement (Activity 1)

English Learners

- MLR8 (Activity 1)

Instructional Routines

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

Materials to Gather

- Base-ten blocks: Activity 1, Activity 2

Materials to Copy

- Card Sort: Numbers in Their Different Forms (groups of 2): Activity 1
- Numbers in Different Forms Round Table (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

Whose ideas were shared in class today? How can you leverage each of your students' 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

Let Me Count the Ways

Standards Alignments

Building Towards 3.NBT.A.2

Student-facing Task Statement

Select **all** the ways you could represent two hundred fifty-seven.

A. 572
B. 257
C. $200 + 50 + 7$
D. $20 + 500 + 7$
E. $200 + 40 + 17$
F. $100 + 140 + 7$

Student Responses

B, C, and E

Begin Lesson

Warm-up

10 min

Which One Doesn't Belong: Numbers within 1,000

Standards Alignments

Building On 2.NBT.A.1, 2.NBT.A.3

This warm-up prompts students to compare numbers represented in different ways. It gives the teacher an opportunity to hear how students use terminology and talk about characteristics of the items in comparison to one another. During the synthesis, ask students to explain the meaning of any terminology they use, such as place value, hundreds, tens, ones, sum, or base-ten diagram.

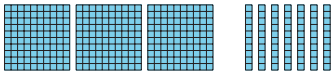
Instructional Routines

Which One Doesn't Belong?

Student-facing Task Statement

Which one doesn't belong?

A.



B. $300 + 70 + 1$

C. $300 + 60 + 10$

D. $400 - 30$

Student Responses

Sample responses:

- A is the only one that is not an expression.
- B is the only one whose value isn't 370.
- C is the only one where the tens aren't together.
- D is the only one that doesn't show addition.

Launch

- Groups of 2
- Display the image and expressions.
- "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 do all of these ways of showing numbers have in common?" (The parts of the number have been separated into hundreds, tens, and ones.)
- "Remember that **expanded form** is a specific way of writing a number as a sum of hundreds, tens, and ones. It is written as a

sum of the value of each digit like in B."

- "How would we write 482 in expanded form?" $(400 + 80 + 2)$

Activity 1

15 min

Card Sort: Numbers in Their Different Forms

Standards Alignments

Building On	2.NBT.A.3
Building Towards	3.NBT.A.2

The purpose of this activity is for students to revisit numbers that are written in different forms. Students match numbers represented in different forms: base-ten numerals, base-ten diagrams, number names, and expanded form. As they make matches, students use their understanding of base-ten structure represented in many different ways (MP7).

Access for English Learners

MLR8 Discussion Supports. Students should take turns finding a match and explaining their reasoning to their partner. Display the following sentence frames for all to see: "I noticed ___ , so I matched . . ." Encourage students to challenge each other when they disagree.
Advances: Listening, Speaking

Access for Students with Disabilities

Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce the remaining cards once students have completed their initial set of matches.
Supports accessibility for: Attention, Visual-Spatial Processing

Materials to Gather

Base-ten blocks

Materials to Copy

Card Sort: Numbers in Their Different Forms (groups of 2)

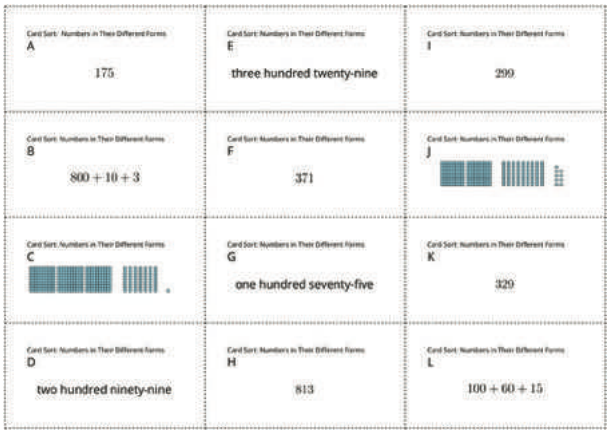
Required Preparation

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

Student-facing Task Statement

Your teacher will give you a set of cards that show numbers in different forms.

Match the cards that represent the same number. Record your matches here. Be ready to explain your reasoning.



Student Responses

A, G, and L
B and H
C and F
E and K
I, D, and J

Sample response: I know that C and F match because 371 has 3 hundreds, 7 tens, and 1 one, and that's what I see in the base-ten diagram.

Launch

- Groups of 2
- Distribute one set of pre-cut cards to each group of students.
- Give students access to base-ten blocks.

Activity

- "This set of cards includes numbers in different forms. Find the cards that match. Work with your partner to explain your matches."
- 8 minutes: partner work time

Synthesis

- Invite students to share the matches they made and how they know those cards go together.
- Attend to the language that students use to describe their matches and numbers in different forms, giving them opportunities to describe the numbers in different forms more precisely.
- Highlight the use of terms like hundreds, tens, ones, word form, expanded form, base-ten blocks, and base-ten diagrams.

Advancing Student Thinking

If students don't match base-ten numerals to the other representations, consider asking:

- "What does each digit in the number represent?"
- "How could we use what each digit represents to match it to another representation?"

Activity 2

20 min

Numbers in Different Forms Round Table

Standards Alignments

Building Towards 3.NBT.A.2

The purpose of this activity is for students to use place value understanding from grade 2 to decompose numbers in different ways. In small groups, students start by writing a three-digit number, and then pass their number to the group member to their right. Each time students receive the number, they decompose it in a different way. In the synthesis, students look for connections in the ways their number was decomposed, and in all the recording sheets in their group. Highlight connections that show that place value can be used to represent a number as different combinations of hundreds, tens, and ones. This will be helpful later in the unit when students add and subtract using strategies and algorithms based on place value.

Materials to Gather

Base-ten blocks

Materials to Copy

Numbers in Different Forms Round Table (groups of 1)

Student-facing Task Statement

Your teacher will give you a recording sheet.

Part 1

1. In Box 1, write a three-digit number. (Pause for your teacher's instructions.)
2. In Box 2, show a way that the number could be decomposed. (Pause for teacher instructions.)
3. In Box 3, show a way that the number could be decomposed that's different from Box 2. (Pause for teacher instructions.)
4. In Box 4, show a way that the number could be decomposed that's different from Boxes 2 and 3.

Part 2

Launch

- Groups of 4
- Display: 365
- "What are some ways you could decompose this number?"
- 30 seconds: quiet think time
- Share and record responses.
- Give each student a copy of the Instructional master.
- "Take a minute and think of a three-digit number that you will use for this activity."
- 30 seconds: quiet think time.
- "Now write your number in the first box on your sheet."

1. Look at the different ways your number was decomposed on your recording sheet. What connections do you see between them?
2. Look at all of the recording sheets for your group. What patterns do you notice in the ways the numbers are decomposed?

Student Responses

Sample responses:

Part 1

1. 485
2. $400 + 80 + 5$
3. $300 + 180 + 5$
4. $400 + 70 + 15$

Part 2

1. Sample response: I can see the 80 in all the representations. It's the digit 8 in the first one and the 80 in the second and third ones. In the last one it's harder to see because it's the 70 and the 10 from the 15.
2. Sample response: All of the representations used hundreds, tens, and ones in some way to represent the number.

Activity

Part 1

- "Pass your paper to your right and receive the paper from your left. The paper has a number in Box 1. In Box 2, show one way the number you were just passed can be decomposed."
- 1-2 minutes: independent work time
- "Pass your paper to your right and receive the paper from your left. The paper has a number in Box 1 and one way of decomposing that number in Box 2. In Box 3, show another way the number you were just passed can be decomposed."
- 1-2 minutes: independent work time
- "Pass your paper to your right and receive the paper from your left. The paper shows two ways of decomposing a number. In Box 4, show another way to decompose that number."
- 1-2 minutes: independent work time
- "Pass your paper one more time. You should have your original number back."
- "Talk to your group about which box was the most difficult for you to fill in. Share ideas about what helped you most during this activity."
- 2-3 minutes: group discussion
- Share responses.

Part 2

- "Look at what was written to represent your number. Write down any connections you notice between the different ways the number was represented."
- 3 minutes: independent work time
- "Now, look at the recording sheets of everyone in your group. What patterns do you notice in the ways the numbers are decomposed?"

- 2-3 minutes: group discussion

Synthesis

- Have groups share the connections they saw across the sheets.

Advancing Student Thinking

If students don't generate decompositions based on place value, consider asking:

- “How did you decompose the number?”
- “How could you use base-ten blocks to come up with other ways to decompose the number?”

Lesson Synthesis

10 min

Display: 253

“Today we decomposed numbers in lots of different ways. What are some ways that we could decompose 253?” ($200 + 50 + 3$, $200 + 40 + 13$, $100 + 150 + 3$)

Display: $253 + 134$

“If you were adding 253 and 134, which way of decomposing the numbers do you think would be most helpful and why?” (I think decomposing them by hundreds, tens, and ones would be most helpful so you could add hundreds and hundreds, tens and tens, and ones and ones.)

Suggested Centers

- Target Numbers (1–5), Stage 6: Add Hundreds, Tens, or Ones (Addressing)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Addressing)

Complete Cool-Down

Response to Student Thinking

Students do not select all the ways that they can represent two hundred fifty-seven.

Next Day Support

- Before the warm-up, have students discuss different ways that 257 can be decomposed using place value.

Lesson 2: Addition and Subtraction Situations

Standards Alignments

Addressing 3.NBT.A.2, 3.OA.D.9

Teacher-facing Learning Goals

- Solve addition and subtraction problems within 1,000 in a way that makes sense to them.

Student-facing Learning Goals

- Let's solve problems involving addition and subtraction.

Lesson Purpose

The purpose of this lesson is for students to use addition and subtraction to solve problems within 1,000.

Prior to this grade, students used various strategies and representations to solve problems involving addition and subtraction of multi-digit numbers (first within 100, and then within 1,000).

This lesson enables the teacher to see the strategies and representations that students use, which may include base-ten blocks or diagrams, number lines, or equations. It also elicits what students know about using place value to add or subtract (for instance, combining hundreds and hundreds, tens and tens, and ones and ones). The work here prepares students to learn algorithms for addition and subtraction, which are also grounded in the same ideas.

Access for:

Students with Disabilities

- Action and Expression (Activity 2)

English Learners

- MLR8 (Activity 2)

Instructional Routines

5 Practices (Activity 1), Notice and Wonder (Warm-up)

Materials to Gather

- Base-ten blocks: Activity 1

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

What strategy did you anticipate today? Which did you not anticipate?

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

5 min

How Much Taller?

Standards Alignments

Addressing 3.NBT.A.2

Student-facing Task Statement

The Statue of Liberty is 305 feet tall. The Brooklyn Bridge is 133 feet tall.

How much taller is the Statue of Liberty than the Brooklyn Bridge? Explain or show your reasoning.

Student Responses

172 feet. Sample response: I drew a number line and started at 133. Then I jumped 7 to 140 and 60 more to 200. I jumped 100 to get to 300. Then, I jumped 5 more to get to 305. Finally, I added up all my jumps on the number line. $7 + 60 + 100 + 5$ is 172.

Begin Lesson

Warm-up

10 min

Notice and Wonder: Two Curious Tables

Standards Alignments

Addressing 3.OA.D.9

The purpose of this warm-up is to elicit observations about patterns in addition tables containing sums of two-digit addends that are multiples of 10. Each table is partially filled out to show certain behaviors of the sums and highlight some properties of operations. For example, the sums in the first table can illustrate the commutative property ($10 + 30$ and $30 + 10$ both give 40). The sums in the second table can help students to intuit the associative property ($50 + 10 = (40 + 10) + 10 = 40 + (10 + 10) = 40 + 20$, though students are not expected to generate equations as shown here).

While students may notice and wonder many things about the addition tables, focus the discussion on the patterns in the tables and possible explanations for them. When students make sense of patterns in sums and try to explain them in terms of the features of the addends and how they are added, they look for and make use of structure (MP7).

Instructional Routines

Notice and Wonder

Student-facing Task Statement

What do you notice? What do you wonder?

+	10	20	30	40	50
10			40		
20			50		
30	40	50	?	70	80
40			70		
50			80		

+	10	20	30	40	50
10	20				60
20		40		60	
30			?		
40		60		80	
50	60				100

Student Responses

Students may notice:

- The two tables have the same numbers

Launch

- Groups of 2
- Display the tables.
- "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 do you think the tables work? How do we know what numbers go in the cells?" (Each number in the row at the top is added to each number in the first column on the left.)
- For each of the following questions, give students a minute of quiet think time. Illustrate their responses with equations, if

across the top and along the left side.

- All the numbers end with 0 and are tens (or groups of 10).
- Each table has a question mark.
- In the first table:
  - The sums in the middle row and middle column are the same set of numbers.
  - The sums increase by 10 each time from left to right and top to bottom.
- In the second table:
  - The cells that run diagonally are filled with numbers.
  - The numbers from the upper left to lower right go up by 20 each time.
  - The numbers from the lower left to upper right are all 60.
  - There is a 100 in the bottom right corner.

Students may wonder:

- Why do the numbers in the first table go up by 10 from left to right and top to bottom?
- In the first table, why are the two sets of numbers the same?
- In the second table, why does one set of numbers go up by 20 from top to bottom and the other set shows the same number?
- How do the tables work? What numbers go in the blank cells?
- What numbers do the question marks represent?

possible.

- "In the first table, why are the sums in the middle row and the middle column the same set of numbers?" (The same pairs of numbers are added. The first number in the middle row and in the middle column are 40 because they are both the sum of 10 and 30, just added in different orders: $10 + 30$ and $30 + 10$.)
- "In the second table, why are the sums from the lower left corner to the upper right corner all 60?" (Each time, the first number being added goes up by 10 and the second number goes down by 10, so the sum stays the same.)

Activity 1

25 min

Monuments and Falls

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to solve word problems that involve adding or subtracting numbers within 1,000, using strategies they are familiar with from earlier grades. The goal is to elicit and highlight strategies that rely on place value understanding, in preparation for upcoming work on addition and subtraction algorithms, which also rely on place value.

Monitor for the following strategies as students work on the last problem about the Eiffel Tower:

- Starting at 328 and counting on by place to 674. This could be represented on a number line or a series of equations.
- Starting at 674 and counting back to 328. This could be represented on a number line or as a series of equations.
- Subtracting 328 from 674 using base-ten blocks, subtracting hundreds from hundreds, tens from tens, and ones from ones, trading a ten for more ones as needed.

As students interpret quantities in context, reason about ways to represent them, and consider the solutions in terms of the situation, they practice reasoning quantitatively and abstractly (MP2).

Instructional Routines

5 Practices

Materials to Gather

Base-ten blocks

Student-facing Task Statement

Solve each problem. Explain or show your reasoning.

1. Iguazu Falls in South America marks the border between Paraguay, Brazil, and Argentina. It is the largest waterfall in the world.

   The waterfall has two parts. The water falls 115 feet in the first part and 131 feet in the second part. How far down does the water fall altogether?

Launch

- Groups of 2
- "We are going to solve some problems that involve famous places and great heights."
- "Take a couple of minutes to quietly read the problems and look at the pictures. Be prepared to share what you think the problems are about and how they are alike or different."
- 2 minutes: quiet think time
- Share responses.

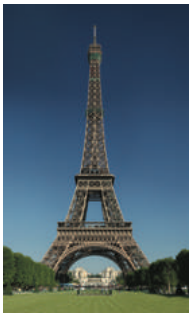
2. In Washington, D.C., there are many monuments that honor important people in American history.

   The Lincoln Memorial is 99 feet tall. The Washington Monument is 555 feet tall.

   How much taller is the Washington Monument than the Lincoln Memorial?

3. The Eiffel Tower in Paris, France, has 674 steps that go from the ground to the second floor. There are 328 steps from the ground to the first floor.

   How many steps are there from the first floor to the second floor?



- Give students access to base-ten blocks.

Activity

- "Work with your partner to solve these problems."
- 5-7 minutes: partner work time
- Monitor for the strategies used to solve the Eiffel Tower problem and identify students who use different strategies to share during synthesis.
- As student work, consider asking:
  - "How could you represent the problem?"
  - "What does this represent in the problem?"
  - "What strategies could you use to solve the problem?"

Synthesis

- Select previously identified students to share in the sequence shown in the Student Responses.
- Ask:
  - "How are these strategies the same?"
  - "How are these strategies different?"
- If no students mention using place value to find sums or differences, ask them about it.

Student Responses

1. 246 feet. Sample reasoning: I added the hundreds to get 200, the tens to get 40, and the ones to get 6. Altogether this is 246.
2. 456 feet. Sample reasoning:
   $99 + 1 = 100$
   $100 + 400 = 500$
   $500 + 55 = 555$
   $1 + 400 + 55 = 456$
3. 346 steps. Sample reasoning:
   - I started at 328 and added 2 to get to 330, then added 70 to get to 400. Then, I added 200 to get to 600, 70 to get to 670, and 4 to get to 674. Then I added $2 + 70 + 200 + 70 + 4$, which is 346.
   - $674 - 74 = 600$
     $600 - 200 = 400$
     $400 - 70 = 330$
     $330 - 2 = 328$
   - I made 674 with base-ten blocks. Before I took away 328 I noticed I didn't have enough ones, so I traded 1 ten for 10 ones. Then I subtracted 3 hundreds, 2 tens, and 8 ones. This left me with 3 hundreds, 4 tens, and 6 ones, which is 346.

Advancing Student Thinking

If students don't find a solution to the problems, consider asking:

- "What is this problem about? What can be counted or measured in this situation?"
- "How could you represent the problem with base-ten blocks?"

Activity 2

10 min

Journal About Connections

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to reflect on the strategies they used in the first activity. This is an opportunity to check in with students about the strategies from grade 2 they are comfortable using and those they find more challenging.

Access for English Learners

MLR8 Discussion Supports. Invite students to begin partner interactions by repeating the question, "What math did you do today that connected to something you did in an earlier grade? Describe something you really understand after today's lesson."
Advances: Conversing

Access for Students with Disabilities

Action and Expression: Develop Expression and Communication. Provide students with alternatives to writing on paper: students can share their response to the prompt orally, with the option of using manipulatives, instead of writing it on paper.
Supports accessibility for: Fine Motor Skills, Social-Emotional Functioning

Student-facing Task Statement

Respond to one of these journal prompts:

- What math did you do today that connected to something you did in an earlier grade?
- Describe something you really understand after today's lesson.
- Describe something that was confusing, challenging, or that you'd like to learn more about.

Student Responses

Answers vary.

Launch

- Groups of 2

Activity

- "Take some time to respond to one of these journal prompts. You can respond to more than one prompt if you have time."
- 5-7 minutes: independent work time
- "Now, take a few minutes and share your response with your partner."
- 2 minutes: partner discussion

Synthesis

- Invite 2-3 students to share their journal responses with the class.

Lesson Synthesis

10 min

"Today we used different strategies to solve problems that involve addition and subtraction within 1,000."

"What is a strategy you like to use for addition or subtraction and why?" (I like to use base-ten blocks to subtract because it helps me see when I need to trade for more ones.)

"What is a strategy for addition or subtraction that you would like to learn more about?" (I would like to learn more about the counting up strategy that can be used in subtraction problems.)

Suggested Centers

- Target Numbers (1–5), Stage 6: Add Hundreds, Tens, or Ones (Addressing)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Addressing)
- Rectangle Rumble (3–5), Stage 2: Factors 1–5 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students do not find the difference in heights.

Next Day Support

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

Lesson 3: Add Your Way

Standards Alignments

Building On	2.NBT.B.7
Addressing	3.NBT.A.2

Teacher-facing Learning Goals

- Add within 1,000 in a way that makes sense to them.

Student-facing Learning Goals

- Let's add numbers within 1,000.

Lesson Purpose

The purpose of this lesson is for students to use strategies to add within 1,000.

In this lesson, students review a variety of strategies used to add within 1,000 with an emphasis on adding hundreds and hundreds, tens and tens, and ones and ones. Students should have access to base-ten blocks.

Access for:

Students with Disabilities

- Engagement (Activity 1)

English Learners

- MLR6 (Activity 2)

Instructional Routines

Number Talk (Warm-up)

Materials to Gather

- Base-ten blocks: Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	25 min
Activity 2	10 min
Lesson Synthesis	10 min

Teacher Reflection Question

What strategies are students most comfortable using to add within 1,000? How will you leverage that student understanding in upcoming lessons on addition algorithms?

Cool-down	5 min

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

5 min

Add It Up

Standards Alignments

Addressing 3.NBT.A.2

Student-facing Task Statement

Find the value of $258 + 217$. Explain or show your reasoning.

Student Responses

475. Sample response: I added the ones to get 15, the tens to get 60, and the hundreds to get 400. Then I added $15 + 60 + 400$ to get 475.

Begin Lesson

Warm-up

10 min

Number Talk: Hundreds, Tens, and Ones

Standards Alignments

Building On 2.NBT.B.7
Addressing 3.NBT.A.2

The purpose of this Number Talk is to elicit strategies and understandings students have for adding three-digit numbers. These understandings help students develop fluency and will be helpful later in this lesson when students are to use strategies based on place value and properties of operations to add within 1,000.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $200 + 40 + 7$
- $50 + 300 + 2$
- $40 + 600 + 12$
- $500 + 17 + 130$

Student Responses

- 247: I just thought about combining the hundreds, tens, and ones.
- 352: I saw that there were hundreds, tens, and ones, but they were just mixed up.
- 652: I saw that there were hundreds. Then, I broke the 12 into a 10 and a 2. Then there were 6 hundreds, 5 tens, and 2 ones. 652
- 647: I saw there were only 7 ones, but there were some tens in different places. I added up the tens from 17 and 130, which made 4 tens. Then I added up the hundreds from 500 and 130, which made 6 hundreds. So, there were 6 hundreds, 4 tens, and 7 ones. 647.

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

- "How did you use place value to find the value of each sum?" (I added hundreds with hundreds and tens with tens.)
- 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 problem in a different way?"
  - "Does anyone want to add on to____'s strategy?"

Activity 1

25 min

Strategies to Add

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to add within 1,000 using any strategy that makes sense to them. The expressions in this activity give students a chance to use different strategies, such as adding hundreds to hundreds, tens to tens, and ones to ones, reasoning with numbers close to a hundred, or using a variety of representations. Students who use base-ten blocks or draw number line diagrams choose appropriate tools strategically (MP5).

Access for Students with Disabilities

Engagement: Provide Access by Recruiting Interest. Leverage choice around perceived challenge. Invite students to select 3 of the 4 expressions to complete. Encourage the completion of the last two expressions, as they will be the focus of the synthesis.
Supports accessibility for: Organization, Attention, Social-emotional skills

Materials to Gather

Base-ten blocks

Student-facing Task Statement

Find the value of each sum in any way that makes sense to you. Explain or show your reasoning.

1. $325 + 102$
2. $301 + 52$
3. $276 + 118$
4. $298 + 305$

Student Responses

1. 427. Sample responses: I used base-ten blocks to make both numbers, then counted up the total.
2. 353. Sample response: I knew that 52 plus 1 is 53. I put that with the hundreds from the first number and got 353.
3. 394. Sample reasoning:
   $200 + 100 = 300$
   $70 + 10 = 80$
   $6 + 8 = 14$
   $300 + 80 + 14 = 394$
4. 603. Sample response: I added the

Launch

- Groups of 2
- Give students access to base-ten blocks.
- "Take a minute to think about how you could find the value of each sum."
- 1 minute: quiet think time
- Share responses.

Activity

- "Work with your partner to add these numbers in any way that makes sense to you. Explain or show your reasoning."
- 5-7 minutes: partner work time
- Monitor for an expression for which students use a variety of representations, such as:
  - Using base-ten blocks
  - Drawing a number line
  - Writing their reasoning in words
  - Writing equations
- Identify students using different

hundreds to get 500. Then I added the tens to get 90 because 305 has a zero in the tens place. Then, I added the ones to get 13. This made a new ten, which then made a new hundred. After the new hundred, there were 3 ones and 6 hundreds, which makes 603.

representations to share during synthesis.

Synthesis

- Select previously identified students to display their work side-by-side for all to see.
- "Which representations show the same idea or help us find the sum the same way?" (The base-ten blocks and equations show adding hundreds to hundreds, tens to tens, and ones to ones. The number line and the words both added on the second number to the first number in parts.)

Activity 2

10 min

Two Ways to Add

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to see that they can start adding from the largest place-value unit or from the smallest and still get the same sum. This understanding prepares students to use the standard algorithm for addition, which calls for starting with the ones.

Access for English Learners

MLR6 Three Reads: Keep books or devices closed. Display only the problem stem, without revealing the question. "We are going to read this problem 3 times." After the 1st Read: "Tell your partner what this situation is about." After the 2nd Read: "List the quantities. What can be counted or measured?" Reveal the question(s). After the 3rd Read: "What strategies can we use to solve this problem?"
Advances: Reading, Representing

Student-facing Task Statement

Andre found the value of $276 + 118$. His work is shown.

$$200 + 100 = 300$$
$$70 + 10 = 80$$
$$6 + 8 = 14$$
$$300 + 80 + 14 = 394$$

Clare found the value of $276 + 118$. Her work is shown.

$$6 + 8 = 14$$
$$70 + 10 = 80$$
$$200 + 100 = 300$$
$$14 + 80 + 300 = 394$$

With your partner, discuss:

- What's different about Clare and Andre's work?
- What's the same?

Student Responses

Andre started with the hundreds, but Clare started with the ones. They both used place value, but went in different order. They both added hundreds and hundreds, tens and tens, and ones and ones. They both had to add up the hundreds, tens, and ones at the end.

Launch

- Groups of 2
- "Take a minute to look at Clare and Andre's work. Think about how their work is alike and how it's different."
- 1 minute: quiet think time

Activity

- "Talk with your partner about what's different about Clare and Andre's work and what's the same."
- 3-5 minutes: partner discussion

Synthesis

- Invite students to share their responses.
- Consider asking:
  - "If you were to describe the steps that Andre took to add and the steps that Clare took to add, what would they be?" (Andre added the hundreds, added the tens, added the ones, then added up all the parts to find the sum. Clare added the ones, added the tens, added the hundreds, then added up the parts to find the sum.)
  - "How is it that Andre started with the hundreds and Clare started with the ones, but they both found the same sum?" (It doesn't matter the order that we add the numbers. If they're the same numbers we'll get the same sum.)

Lesson Synthesis

10 min

"Today we added numbers using many different strategies and representations. What is your favorite

representation to use when you add numbers?" (Sample responses: I like to use base-ten blocks so I can see the numbers I am adding. I like to write equations because it shows me how I am adding the numbers.)

"Does the way you add numbers or the representation you use change based on the numbers in the problem?" (Sample responses: Yes, I use mental math when I see that one of the numbers is close to a hundred. No, I always add hundreds to hundreds, tens to tens, and ones to ones. I always like to draw a number line.)

"Keep all these strategies in mind as we learn new ways to show our reasoning when adding in the upcoming lessons."

Suggested Centers

- Target Numbers (1–5), Stage 6: Add Hundreds, Tens, or Ones (Addressing)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Addressing)
- Rectangle Rumble (3–5), Stage 2: Factors 1–5 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students make a minor mistake carrying out their strategy.

Next Day Support

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

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

Prior Unit Support

Grade 2, Unit 7, Section B: Add within 1,000 using Place Value Strategies

Lesson 4: Introduction to Addition Algorithms

Standards Alignments

Addressing 3.NBT.A.2

Teacher-facing Learning Goals

- Add within 1,000.
- Relate base-ten diagrams to written algorithms for addition.

Student-facing Learning Goals

- Let's learn new ways to add.

Lesson Purpose

The purpose of this lesson is for students to use their knowledge of base-ten diagrams to make sense of two written addition algorithms.

In a previous lesson, students revisited addition within 1,000 using strategies based on place value, and properties of operations. An **algorithm** is different from a strategy because it is a set of steps that works every time as long as the steps are carried out correctly. The algorithms introduced in this lesson draw on the grade 2 work within 1,000 in that they show the addition of ones to ones, tens to tens, and hundreds to hundreds. Students should have access to base-ten blocks if they choose to use them.

Access for:

Students with Disabilities

- Engagement (Activity 2)

English Learners

- MLR7 (Activity 1)

Instructional Routines

MLR3 Clarify, Critique, Correct (Activity 2), Which One Doesn't Belong? (Warm-up)

Materials to Gather

- Base-ten blocks: Activity 1, Activity 2

Lesson Timeline

Warm-up	10 min
Activity 1	20 min

Teacher Reflection Question

In grade 2, students spent significant time working with place value. How did students' work with place value prepare them for the

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

move to using algorithms to add?

Cool-down (to be completed at the end of the lesson) 5 min

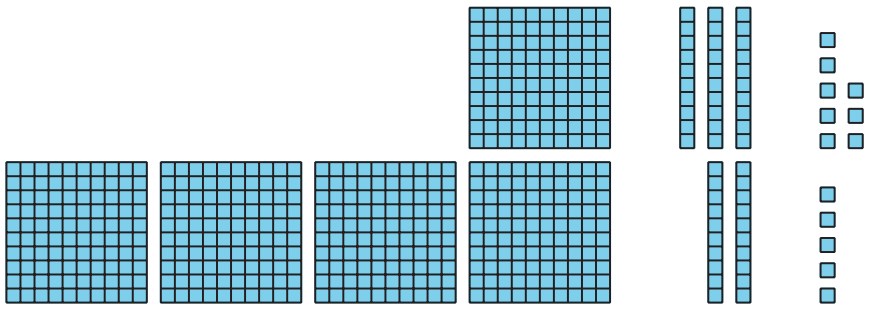
Choose an Algorithm

Standards Alignments

Addressing 3.NBT.A.2

Student-facing Task Statement

A diagram of the base-ten blocks that represent $138 + 425$ is shown.



Use an algorithm you learned in today's lesson to find the value of the sum.

Student Responses

563 or $500 + 50 + 13$. Students can use either algorithm from the lesson.

Begin Lesson

Warm-up 10 min

Which One Doesn't Belong: 247

Standards Alignments

Addressing 3.NBT.A.2

This warm-up prompts students to compare three expressions and one three-digit number. During the synthesis, ask students to explain the meaning of any terminology they use, such as the value of each expression and ways that place value was used to write the number 247 in different ways.

Instructional Routines

Which One Doesn't Belong?

Student-facing Task Statement

Which one doesn't belong?

A. $200 + 30 + 17$ B. 247

C. $200 + 47 + 10$ D. $100 + 140 + 7$

Student Responses

- A is the only one that doesn't have a 4 in it.
- B is the only one that doesn't have any plus signs and is not a sum of hundreds, tens, and ones.
- C is the only one that is not equal to 247.
- D is the only one that doesn't have a 2 in it.

Launch

- Groups of 2
- Display the expressions and number.
- "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 did you know that A and D were equal to 247?" (In A there were 2 hundreds, 4 tens, and 7 ones, but some of the tens were with the ones. In D there were 2 hundreds, 4 tens, and 7 ones, but some of the hundreds were with the tens.)
- Consider stating: "Let's find at least one reason why each one doesn't belong."

Activity 1

20 min

What is an Algorithm?

PLC Activity

Standards Alignments

Addressing 3.NBT.A.2

In this activity, students use their knowledge of base-ten representations and place value to make sense of two addition algorithms. One algorithm shows the addends in expanded form. Both algorithms show the sums of ones, tens, and hundreds separately, but display these partial sums differently. Students notice that both algorithms show hundreds added to hundreds, tens to tens, and ones to ones, regardless of order. In the synthesis, introduce the term "algorithm."

Access for English Learners

MLR7 Compare and Connect. Synthesis: Invite groups to prepare a visual display that shows the strategy they used to find the value of the sums. Encourage students to include details that will help others interpret their thinking. For example, specific language, using different colors, shading, arrows, labels, notes, diagrams or drawings. Give students time to investigate each others' work. During the whole-class discussion, ask students, "What did the representations have in common?", "How were they different?", "How did the total sum show up in each method?" *Advances: Representing, Conversing*

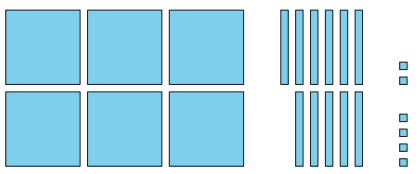
Materials to Gather

Base-ten blocks

Student-facing Task Statement

Three students found the value of $362 + 354$. Their work is shown. Explain how each method works.

1. Tyler's drawing



Launch

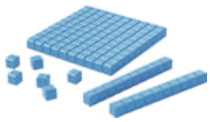
- Groups of 2
- Give students access to base-ten blocks.
- "In an earlier lesson, we saw many ways to find the value of a sum. Take a minute to look at how these 3 students added $362 + 354$."
- 1 minute: quiet think time

2. Lin's method

$$\begin{array}{rrrrrr} & 300 & + & 60 & + & 2 \\ + & 300 & + & 50 & + & 4 \\ \hline & 600 & + & 110 & + & 6 \end{array}$$

3. Han's method

$$\begin{array}{rrrr} & 3 & 6 & 2 \\ + & 3 & 5 & 4 \\ \hline & & & 6 \\ & 1 & 1 & 0 \\ + & 6 & 0 & 0 \\ \hline & 7 & 1 & 6 \end{array}$$



Student Responses

Sample responses:

1. Tyler represented each number he was adding with base-ten blocks. He kept hundreds with hundreds, tens with tens, and ones with ones. He saw that there were 7 hundreds because he was able to make another hundred out of 10 tens. That left him with 1 ten and 6 ones. So, the answer was 716.
2. Lin wrote each number in expanded form and stacked them on top of each other. Then, she added hundreds with hundreds, tens with tens, and ones with ones. Then, she added up all the parts to get the total.
3. Han wrote the numbers stacked on each other so the ones lined up, the tens lined up, and the hundreds lined up. He added the ones, then the tens, then the hundreds. After he added all the places he adds the digits in each column to get the sum.

Activity

- "Work with your partner to explain how each method works."
- 7-10 minutes: partner work time.

Synthesis

- For each method, ask a student share their explanation. As students share, record the sequence of steps they describe in their explanation.
- Consider asking:
  - "Who can restate _____ 's reasoning in a different way?"
  - "Did anyone have a similar idea but would explain it differently?"
  - "Did anyone explain the method in a different way?"
  - "Does anyone want to add on to____'s explanation?"
- As students add on, edit the steps so the class is in agreement about how each method works.
- "Lin and Han used **algorithms** to solve this problem. An algorithm is a set of steps that works every time as long as the steps are carried out correctly."
- "How are Lin and Han's algorithms the same?" (They both add ones to ones, tens to tens, and hundreds to hundreds.)
- "How are the algorithms different?" (Lin writes the number in expanded form, but Han didn't. Lin hasn't added the sums of hundreds, tens, and ones, but Han has.)
- Consider asking:
  - "Can we tell which place Lin started with? Why or why not?" (We can't really tell with Lin's method because of how the numbers are next to each other. She might have started with the ones or the hundreds. No

matter which place she starts with she would get the same sum.)

Advancing Student Thinking

If students don't explain one of the written algorithms, consider asking:

- "What did Lin (or Han) do to add the numbers?"
- "How is their work related to Tyler's drawing?"

Activity 2

15 min

Try an Algorithm

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to try the algorithms they saw earlier in the lesson. The important thing is that they combine hundreds and hundreds, tens and tens, and ones and ones, which should be a familiar idea from grade 2. The synthesis provides an opportunity to show a different way of recording newly composed tens and hundreds when compositions are required, which will be discussed in more detail in subsequent lessons. Provide access to base-ten blocks for students to use to support their reasoning about the algorithms, in case requested.

Students analyze and improve a given explanation of how to find a sum, filling in details and using more precise language to explain the calculation more fully (MP3, MP6).

This activity uses *MLR3 Clarify, Critique, Correct*. *Advances: reading, writing, representing*

Access for Students with Disabilities

Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Check in with students to provide feedback and encouragement after each chunk.
Supports accessibility for: Organization, Social-Emotional Functioning

Instructional Routines

MLR3 Clarify, Critique, Correct

Materials to Gather

Base-ten blocks

Student-facing Task Statement

Try using an algorithm to find the value of each sum. Show your thinking. Organize it so it can be followed by others.

1. $475 + 231$
2. $136 + 389$
3. $670 + 257$

Student Responses

Students can use either algorithm from the previous activity.

1. 706
2. 525
3. 927

Launch

- Groups of 2
- Give students access to base-ten blocks.
- "Now you are going to have a chance to try the algorithms that Lin and Han used in the last activity. Take a minute to think about which algorithm you want to use for each problem."
- 1 minute: quiet think time

Activity

- "Work with your partner to try an algorithm to find the value of each sum."
- 5 minutes: partner work time
- Monitor for students who use Lin's algorithm and Han's algorithm on the last problem.

Synthesis

- Select previously identified students to share their work on the last expression.

MLR3 Clarify, Critique, Correct

- Display the following partially correct answer and explanation:

$$\begin{array}{r} 6\ 7\ 0 \\ +\ 2\ 5\ 7 \\ \hline \quad\quad 7 \\ \quad\ 2\ 0 \\ 1\ 0\ 0 \\ +\ 8\ 0\ 0 \\ \hline 9\ 2\ 7 \end{array}$$

I added the ones, the tens, and then hundreds.

- Read the explanation aloud.
- "What is unclear?"
- 1 minute: quiet think time
- 2 minute: partner discussion
- "With your partner, work together to write a revised explanation."
- Display and review the following criteria:
    - Explanation for each step
    - Words such as: first, next, then
- 3–5 minute: partner work time
- Select 1–2 groups to share their revised explanation with the class. Record responses as students share. (Sample explanation: First, I stacked the numbers vertically. Then, I added the ones to get 7 and recorded a 7 below the ones place. Next, I added 70 and 50 and got 120. I recorded 20 below the 7 and 100 below the 20. I added 600 and 200 to get 800 and recorded that below the 100. Then I added and wrote 927 as the answer.)
- "What is the same and different about the explanations?" (Both explanations say that they added the ones, tens, and hundreds, but the revised explanation gives more detail about how to record each step.)
- "How is this way of recording this work the same or different from Han's method in the first activity?" (Han would record 120 in the second row where we record the tens. It

was 12 tens, but that's the same as 1 hundred and 2 tens. We could record 100 on one line and 20 on the next line.)

Lesson Synthesis

10 min

Display Lin and Han's algorithms.

"Today we learned about two different algorithms or two different sets of steps for finding the value of a sum. How are the 2 algorithms alike? How are they different?" (Alike: They give the same result at the end. They both involve using place value and stacking the numbers being added. It doesn't matter which place value unit we add first. Different: In one algorithm the numbers being added are written in expanded form.)

Suggested Centers

- Target Numbers (1–5), Stage 6: Add Hundreds, Tens, or Ones (Addressing)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Addressing)
- Rectangle Rumble (3–5), Stage 2: Factors 1–5 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students find the sum, but do not use an addition algorithm.

Next Day Support

- During the launch of the next day's activity, have students describe the steps used in the algorithms.

Lesson 5: Another Addition Algorithm

Standards Alignments

Addressing 3.NBT.A.2, 3.OA.D.9

Teacher-facing Learning Goals

- Relate written algorithms to each other using place value understanding.

Student-facing Learning Goals

- Let's learn another algorithm to add.

Lesson Purpose

The purpose of this lesson is for students to use an addition algorithm that records a single digit for the sum for each place value position and a 10 or 100 for a newly composed ten or hundred.

In this lesson, students learn an addition algorithm in which a single digit is recorded for the sum of each place value position. Students relate this algorithm to an algorithm they worked with in the previous lesson. Students also learn a method for recording a newly composed ten or hundred as a 10 or 100 above the addends. Students recognize that the new algorithm and new method of recording newly composed tens or hundreds are based on the idea of adding units by place value.

Access for:

Students with Disabilities

- Action and Expression (Activity 1)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Notice and Wonder (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

Think about times when students were able to make connections to and build on the ideas of their peers during discussions today. What norms or routines allowed students to engage with other students' ideas?

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

5 min

Use an Algorithm for Addition

Standards Alignments

Addressing 3.NBT.A.2

Student-facing Task Statement

Use an algorithm of your choice to find the value of $365 + 182$.

Student Responses

547. Students can use any of the three addition algorithms learned so far.

Begin Lesson

Warm-up

10 min

Notice and Wonder: Another Curious Table

Standards Alignments

Addressing 3.OA.D.9

The purpose of this warm-up is to elicit observations about patterns in sums of two- and three-digit addends in an addition table. The table is partially filled out to highlight some properties of operations. For example, the sums in the table can illustrate the commutative property ($99 + 98$ and $98 + 99$ both give 197). The numbers also prompt students to notice patterns in sums of odd and even numbers. For example, the sum of an odd number and an even one is always odd.

While students may notice and wonder many things about the addition table, focus the discussion on the patterns in the table and possible explanations for them. When students make sense of patterns in sums and explain them in terms of the features of the addends and how they are added, they notice and use regularity in repeated reasoning (MP7).

Instructional Routines

Notice and Wonder

Student-facing Task Statement

What do you notice? What do you wonder?

+	98	99	100	101	102
98		197		199	
99	197		199		201
100		?		?	
101	199		201		203
102		201		203	

Student Responses

Students may notice:

- The same numbers are across the top and along the left side.
- Every other cell is filled.
- There are two question marks in the table.
- The sums go up by 2 from left to right, top to bottom, and diagonally from upper left to lower right.
- The sums that make a diagonal line from lower left to upper right are the same number.
- All the sums are odd numbers.

Students may wonder:

- What numbers go in the cells with a question mark?
- Why do the numbers in the table go up by 2 from left to right and top to bottom?
- Why are the sums odd numbers?
- Are there other patterns in the table?

Launch

- Groups of 2
- Display the table.
- "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 do you think the table works?" (The table shows addition. Each number in the row at the top is added to each number in the first column on the left.)
- "What numbers would go in the cells with a question mark?" (199 and 201.) "How do you know?"
- For each of the following questions, give students a minute of quiet think time. Illustrate their responses with equations, if possible.
- "Why do the sums go up by 2 from left to right and top to bottom?" (Because of the skipping, one number being added goes up by 2, so the sum also goes up by 2.)
- "Why do the sums from upper left corner to lower right corner increase by 2?" (Each of the two numbers being added go up by 1, so the sum goes up by 2.)
- "Why are the sums that make a line from the lower left corner to the upper right corner the same number?" (Each time, the first number being added goes up by 1 and the second number goes down by 1, so the sum stays the same.)

- Consider asking: “What do you notice about whether the addends or the sums are even or odd?” (In each pair of addends, one number is even and the other number is odd. All the sums are odd.)

Activity 1

15 min

A New Addition Algorithm

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to learn an algorithm in which a single digit is recorded as each place value position is added. Students use an algorithm from a prior lesson to make sense of the new algorithm. They learn that single digits can be used to represent the sum in each place value position because of what we know about place value.

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: Conceptual Processing

Student-facing Task Statement

Here are two algorithms for adding $367 + 231$.

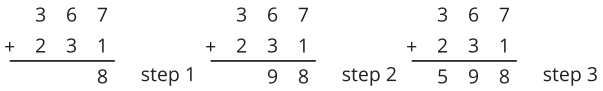
Han’s algorithm

	3	6	7	
+	2	3	1	
			8	step 1
		9	0	step 2
+	5	0	0	step 3
	5	9	8	step 4

Elena’s algorithm

Launch

- Groups of 2
- Display the algorithms.
- “Han and Elena used two different algorithms to solve this problem. The steps they took are labeled in order (point to the different steps). We saw Han's algorithm in an earlier lesson. Think about how Elena’s algorithm works.”
- 2 minutes: quiet think time



Discuss with your partner:

1. How is Elena's algorithm different from Han's algorithm?
2. Why do both algorithms work?

Student Responses

Sample response:

1. There are only 3 steps in Elena's algorithm. Step 4 is already done. Elena's algorithm just uses the digits in each place. Instead of 500, we just see a 5 in the hundreds place. You record from right to left, not down.
2. Even though Elena's algorithm only shows a single digit as she adds the ones, tens, and hundreds, the 9 still represents 9 tens or 90 like in Han's algorithm. The 5 represents 5 hundreds or 500 shown in Han's algorithm. The answer is still 598.

Activity

- "Now discuss with your partner how Elena's algorithm is different from Han's algorithm. Also discuss why both algorithms work."
- 5-7 minutes: partner discussion

Synthesis

- Invite students to share their analyses of Elena and Han's algorithms.
- Display the algorithms and annotate them to illustrate students' explanations.
- Consider asking:
  - "Where do you see the 8, 90, and 500 in Elena's algorithm?"
  - "Why does Han's algorithm have a step 4?"
- Select other students to share their thinking on why both algorithms work.

Advancing Student Thinking

If students do not explain how the algorithms are different, consider asking:

- "What are the steps for each algorithm?"
- "Why does Han's algorithm have an extra step?"

Activity 2

20 min

Compose New Units

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to consider how the composition of new tens and hundreds are recorded in the algorithm they saw in the previous activity. Students interpret the work and thinking of others and discuss the similarities and differences in two different strategies for finding a sum (MP3). Students see that in Elena's algorithm, when the sum of the digits in a place has more than one digit, a newly composed ten or hundred is recorded as "10" or "100" above the addends, while the remaining value is recorded as a single digit below the addends. The synthesis focuses on clarifying how to record newly composed units when adding two numbers.

Access for English Learners

MLR8 Discussion Supports. Synthesis: Some students may benefit from the opportunity to rehearse what they will say with a partner before they share with the whole class.
Advances: Speaking

Student-facing Task Statement

Here are two algorithms for adding $365 + 182$.

Han's algorithm

	3	6	5	
+	1	8	2	
			7	step 1
	1	4	0	step 2
+	4	0	0	step 3
	5	4	7	step 4

Elena's algorithm

					1	0	0			1	0	0
	3	6	5		3	6	5			3	6	5
+	1	8	2	+	1	8	2		+	1	8	2
			7	step 1		4	7	step 2		5	4	7	step 3

1. How do the algorithms show the 14 tens differently?
2. Try Elena's algorithm to find the value of each sum.

Launch

- Groups of 2
- Display Elena's algorithm.
- "What do you notice? What do you wonder?" (Students may notice: Elena is adding from right to left. There is a 100 at the top. She adds ones to ones, tens to tens, and hundreds to hundreds. Students may wonder: Why is there a 100 at the top? Why does she only record one number in each place?)
- 1 minute: quiet think time
- Share and record responses.
- "The first problem mentions '14 tens.' Where might the 14 tens come from?" (From adding 6 tens and 8 tens, or 60 and 80.)

a. $174 + 352$
b. $273 + 619$
c. $354 + 198$
d. $525 + 376$

Student Responses

1. In Han's algorithm, the 14 tens were recorded as 140. In Elena's algorithm, we record 4 in the tens place that represents 40 and 100 is placed at the top of the problem to show the new hundred.

2. a. 526
   b. 892
   c. 552
   d. 901

```
  1 0 0
    1 0
  3 5 4
+ 1 9 8
  5 5 2
```

Activity

- "Work with your partner to answer the first question. Then, pause before moving on to the second set of problems."
- 2 minutes: partner discussion
- Invite students to share how 14 tens are recorded differently in the two algorithms.
- If no students mention that the 100 at the top represents 10 of the 14 tens, or 100 of the 140, bring this to their attention.
- "Now try using Elena's algorithm to find the value of each sum."
- 7-10 minutes: partner work time
- Monitor for how students record multiple compositions of tens or hundreds when finding the value of $354 + 198$.

Synthesis

- Select students to display their work for finding the value of $354 + 198$.
- "How did you decide where to record the new ten and hundred?" (It made the most sense to me to stack the hundred on the ten since the ten was already there.)
- "In this algorithm, we typically stack the newly composed tens or hundreds in the order they happen as we add from right to left, or from the ones place to the tens place to the hundreds place."

Advancing Student Thinking

If students do not record the newly composed tens or hundreds in the second and third problems, consider asking:

- "What new units did you have to compose in this problem?"
- "Where would it make the most sense to you to record the newly composed 10? Where would it make the most sense to you to record the newly composed 100?"

Lesson Synthesis

10 min

Display an expression from the last activity, such as, $174 + 352$.

"In this lesson, we have been adding from right to left, starting with the ones place. Let's look at this expression again. Let's consider what would happen if we started adding from the left with hundreds place."

Work with the class to find the sum, setting it up like Elena's algorithm, but start by adding the hundreds.

"What would happen next? Can we add from left to right?" (If we worked from left to right, we would have to add the hundreds, then add them again if the tens add up to make a new hundred. It's the same with the tens. If we added them before the ones, we would have to add the tens again if the sum of the ones made a new ten.)

Suggested Centers

- Target Numbers (1–5), Stage 6: Add Hundreds, Tens, or Ones (Addressing)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Addressing)
- Rectangle Rumble (3–5), Stage 2: Factors 1–5 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students find the sum, but do not use one of the algorithms they have learned.

Next Day Support

- During the launch of the next day's activity, have students recap the important points of the previous lessons.

Lesson 6: Use Strategies and Algorithms to Add

Standards Alignments

Addressing 3.NBT.A.2

Teacher-facing Learning Goals

- Add within 1,000 using an algorithm or another strategy based on the numbers being added.

Student-facing Learning Goals

- Let's consider when to use algorithms and when to use other strategies to add.

Lesson Purpose

The purpose of this lesson is for students to record newly composed tens and hundreds with a single digit and to consider when they might use algorithms or other strategies to add.

In previous lessons, students learned how to use an algorithm that records a single digit for the sum in each place value position, but records 10 or 100 for a newly composed ten or hundred. The purpose of this lesson is for students to continue to work with algorithms, but see that newly composed tens or hundreds can be recorded as a single digit at the top of the tens column or hundreds column. Students also take time to consider when it makes sense to use an algorithm and when it makes sense to use another strategy, such as those learned in grade 2. Students will consider how thinking about the numbers in the problem can help them use their knowledge of addition flexibly to add within 1,000.

This lesson has a Student Section Summary.

Access for:

Students with Disabilities

- Engagement (Activity 2)

English Learners

- MLR8 (Activity 1)

Instructional Routines

Number Talk (Warm-up)

Lesson Timeline

Warm-up	10 min
Activity 1	15 min

Teacher Reflection Question

What surprised you most about student thinking as they learned how to use algorithms for adding multi-digit numbers?

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

Algorithm or Another Strategy?

Standards Alignments

Addressing 3.NBT.A.2

Student-facing Task Statement

Would you use an algorithm or another strategy to find the value of $299 + 179$?

Explain your reasoning.

Student Responses

Answers vary. Sample response: Instead of using an algorithm, I would take 1 away from 179 and add it to the 299. Then I can find $300 + 178$, which is 478.

Begin Lesson

Warm-up

10 min

Number Talk: Little More, Little Less

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this Number Talk is to elicit strategies and understandings students have for adding within 1,000. These understandings help students develop fluency and will be helpful later in this lesson when students decide whether to use an algorithm or another strategy to add.

When students notice that a number is close to a multiple of 100 and use this to add, they are looking for and making use of structure (MP7).

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $300 + 156$
- $299 + 156$
- $303 + 156$
- $204 + 376$

Student Responses

- 456: $300 + 156$. I added hundreds to 156 to make it 456.
- 455: I noticed that it was just like the first problem, but 1 less, so instead of being 456, it would be 455.
- 459: I noticed that it was just like the first problem, but 3 more, so instead of being 456, it would be 459.
- 580: I started by adding 200 to 376 because it was easy to add more hundreds to get 576. Then I added the extra 4, which made 580.

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

- "What is it that made these numbers easier to add mentally?" (The first 3 were really close to 300 so we were able to add 300 and make little adjustments. In the last problem, the first number was really close to 200 which made it easy to subtract mentally.)
- 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 problem in a different way?"
    - "Does anyone want to add on to____'s strategy?"

Activity 1

15 min

Just Ones

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to compare two methods to record newly composed tens and hundreds when using the same algorithm. The first method, which students saw in a previous lesson, records the newly composed tens and hundreds as a 10 or 100 at the top of the problem. The second method records the newly composed tens and hundreds as a single digit of 1 at the top of the tens and hundreds column. It is important that students understand that an additional 1 in the tens column represents a newly composed ten and an additional 1 in the hundreds column represents a newly composed hundred. Students interpret the work and thinking shown in the different methods, and discuss the similarities and differences (MP3).

Access for English Learners

MLR8 Discussion Supports. Synthesis: Revoice student ideas to demonstrate and amplify mathematical language use. For example, revoice the student statement "because when you add 7 and 6, that's 13, so you have 1 more" as "because when you add 7 and 6, that's 13, so now we have three ones and one new ten."
Advances: Speaking

Student-facing Task Statement

Two methods of recording the addition of $657 + 286$ are shown.

Method 1

$$\begin{array}{r} {\scriptstyle 1\ 0\ 0} \\ {\scriptstyle \ \ 1\ 0} \\ 6\ 5\ 7 \\ +\ 2\ 8\ 6 \\ \hline 9\ 4\ 3 \end{array}$$

Method 2

$$\begin{array}{r} {\scriptstyle 1\ 1\ \ } \\ 6\ 5\ 7 \\ +\ 2\ 8\ 6 \\ \hline 9\ 4\ 3 \end{array}$$

1. How is the newly composed ten and

Launch

- Groups of 2
- "Here are two methods of recording the sum of 657 and 286. Take a minute and think about how the addition is recorded differently in each example."
- 1 minute: quiet think time

Activity

- "Discuss with your partner how the newly composed ten and hundred were recorded differently in the two methods."

hundred recorded differently in each method?

2. Try the second method of recording to add these numbers:

   a. $602 + 179$
   b. $493 + 161$
   c. $438 + 364$
   d. $329 + 381$

Student Responses

1. The newly composed ten and hundred are recorded as 10 and 100 in the first method, but in the second method the ten is recorded as a 1 in the tens place and the hundred is recorded as a 1 in the hundreds place.
2. a. 781
   b. 654
   c. 802
   d. 710

- 2-3 minutes: partner discussion
- Share student responses.
- "Now work with your partner to try the second method of recording to find each sum in the second set of problems."
- 5-7 minutes: partner work time
- Monitor for student work where the second method of recording is used to share during the synthesis.

Synthesis

- Display student work for each problem.
- Consider asking:
  - "Why did we need to put a 1 in the tens (or hundreds) column?"
  - "What does the 1 in the tens (or hundreds) column represent?"
- "A newly composed unit can be recorded with a single digit. What does the single digit represent?" (If it's in the tens place it stands for 10. If it's in the hundreds place it stands for 100.)
- "How does place value help us remember what the additional ones represent?" (If the 1 is in the tens column, it represents 10. If it is in the hundreds column it represents 100.)

Activity 2

20 min

How Would You Add?

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to choose an algorithm or other strategy to add within 1,000. Students should attend to the details of numbers in the problems that could indicate whether a particular strategy or algorithm is most useful. The important thing is that students choose an algorithm or strategy that they can use efficiently and accurately for the given problem.

Access for Students with Disabilities

Engagement: Develop Effort and Persistence. Check in and provide each group with feedback that encourages collaboration and community. For example, check that students are staying on task, using math vocabulary, and sharing how they solved the problem.
Supports accessibility for: Social-Emotional Functioning

Student-facing Task Statement

Use a strategy of your choice to find the value of each sum. Show your reasoning. Organize it so it can be followed by others.

1. $199 + 348$
2. $264 + 359$
3. $203 + 75$
4. $316 + 198$
5. $399 + 499$

Student Responses

1. 547. Sample response: I changed 199 to 200 since it was so close to 200. Then, I found $200 + 348$, which is 548. Then, I subtracted the 1 added to 199 to get 547.
2. 623. Sample response:

Launch

- Groups of 2
- "We've been learning about addition algorithms for the last few lessons. Recall that an algorithm is a set of steps that works every time as long as the steps are carried out correctly. But, you know lots of ways to add numbers and lots of representations for showing your work like base-ten diagrams, number lines, and writing words or equations. If it's not a set of steps that would work every time, we call it a strategy."
- "In this activity, you're going to have an opportunity to find the value of each of these sums using an algorithm or other strategy of your choice."

Activity

- "Find the value of each sum. Later, you'll have a chance to share your work."
- 7-10 minutes: independent work time
- Identify students who used the same strategy to add and those who used different strategies.
- Choose a few problems for students to discuss. Consider selecting $264 + 359$ (the

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ \ } \\ 2\ 6\ 4 \\ +\ 3\ 5\ 9 \\ \hline 6\ 2\ 3 \end{array}$$

3. 278. Sample response: I thought of the 3 with the 75 which made 78. Then I put the 78 with the 200 to make 278.
4. 514. Sample response:

$$\begin{array}{r} 3\ 1\ 6 \\ +\ 1\ 9\ 8 \\ \hline \ \ \ 1\ 4 \\ 1\ 0\ 0 \\ +\ 4\ 0\ 0 \\ \hline 5\ 1\ 4 \end{array}$$

5. 898. Sample response: I made the 399 a 400 and the 499 a 500 to make them easier to add. I added 400 and 500 and got 900. Then I subtracted the 2 I added, 1 for 399 and 1 for 499. This makes 898.

second expression) and $399 + 499$ (the last expression), which lend themselves to be evaluated with an algorithm and another strategy, respectively.

- "Find a partner that added the same way you did. Discuss your reasoning."
- 1-2 minutes: partner discussion
- "Now find a partner who found the sum in a different way from you. Discuss your reasoning."
- 2-3 minutes: partner discussion
- Repeat the discussion with 1-2 expressions or as many as time permits.

Synthesis

- Invite 4-5 students to share a strategy or algorithm that someone they talked to used.
- "What strategies or algorithms do you want to practice more?"

Lesson Synthesis

10 min

"Today we saw how we can use algorithms and other strategies to add. After hearing what other students chose to use, what are your thoughts about choosing when to use an algorithm or another strategy?" (I like to use a strategy when both numbers are close to a hundred. If the numbers aren't both close to a hundred I just use an algorithm. If I see a relationship that makes it easy to use a strategy, then I'll use one, but if not I'll just use an algorithm.)

Suggested Centers

- Target Numbers (1–5), Stage 6: Add Hundreds, Tens, or Ones (Addressing)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Addressing)
- Rectangle Rumble (3–5), Stage 2: Factors 1–5 (Supporting)

Student Section Summary

In this section, we learned that an **algorithm** is a set of steps that works every time as long as the steps are carried out correctly. Then, we learned algorithms to add numbers within 1,000.

We also learned that we can choose to add using a strategy or an algorithm based on the numbers being added.

$$\begin{array}{rrrrr} & 300 & + & 60 & + & 2 \\ + & 300 & + & 50 & + & 9 \\ \hline & 600 & + & 110 & + & 11 \end{array}$$

$$\begin{array}{rrrr} & 3 & 6 & 2 \\ + & 3 & 5 & 9 \\ \hline & & 1 & 1 \\ & 1 & 1 & 0 \\ + & 6 & 0 & 0 \\ \hline & 7 & 2 & 1 \end{array}$$

$$\begin{array}{rrrr} & {\scriptstyle 1} & {\scriptstyle 0} & {\scriptstyle 0} \\ & & {\scriptstyle 1} & {\scriptstyle 0} \\ & 3 & 6 & 2 \\ + & 3 & 5 & 9 \\ \hline & 7 & 2 & 1 \end{array}$$

$$\begin{array}{rrrr} & & {\scriptstyle 1} & {\scriptstyle 1} \\ & 3 & 6 & 2 \\ + & 3 & 5 & 9 \\ \hline & 7 & 2 & 1 \end{array}$$

Complete Cool-Down

Response to Student Thinking

Students found the correct sum but did not explain their choice of strategy or algorithm.

Next Day Support

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

Section B: Subtract Within 1,000

Lesson 7: Subtract Your Way

Standards Alignments

Addressing 3.NBT.A.2

Teacher-facing Learning Goals

- Subtract within 1,000 in a way that makes sense to them.

Student-facing Learning Goals

- Let's subtract numbers within 1,000.

Lesson Purpose

The purpose of this lesson is to activate the strategies students have for subtracting numbers within 1,000.

In grade 2, students subtracted numbers within 1,000 using various strategies based on place value and the associative and commutative properties of addition. They used base-ten blocks, base-ten diagrams, equations, and number lines to represent their reasoning.

In this lesson, they review a variety of strategies with an emphasis on subtracting hundreds and hundreds, tens and tens, and ones and ones. Students should have access to base-ten blocks.

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR8 (Activity 2)

Instructional Routines

MLR7 Compare and Connect (Activity 1), Number Talk (Warm-up)

Materials to Gather

- Base-ten blocks: Activity 1
- Tools for creating a visual display: Activity 1

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

What strategies are students most comfortable using to subtract within 1,000? How will you leverage that student understanding in upcoming lessons on subtraction algorithms?

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

5 min

Subtract within 1,000

Standards Alignments

Addressing 3.NBT.A.2

Student-facing Task Statement

Find the value of $372 - 158$. Explain or show your reasoning.

Student Responses

214. Sample response: I made 372 with base-ten blocks. I had to trade a ten for some more ones. This gave me 12 ones and 6 tens. Then I subtracted the hundreds to get 200, the tens to get 10, and the ones to get 4. The blocks I had left showed 214.

Begin Lesson

Warm-up

10 min

Number Talk: Subtract Two-Digit Numbers

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this Number Talk is to elicit strategies and understandings students have for subtracting numbers within 1,000. These understandings help students develop fluency and will be helpful as students relate subtraction algorithms to strategies they have used to subtract within 1,000.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $50 - 10$
- $58 - 10$
- $258 - 20$
- $258 - 24$

Student Responses

- 40: I knew that 5 tens minus 1 ten is 4 tens and 4 tens is 40.
- 48: I knew that $50 - 10$ is 40, so this is just 8 more.
- 238: I counted back by tens 258, 248, 238.
- 234: This is just like the last one, but I took away 4 more.

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

- "How was place value helpful as you subtracted these numbers?" (When we were subtracting 10, only the tens place changed. For the last expression we were able to subtract the tens, then the ones.)
- 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 problem in a different way?"
    - "Does anyone want to add on to _____'s strategy?"

Activity 1

25 min

Strategies to Subtract

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to subtract numbers within 1,000 using any strategy that makes sense to them to find the difference of two numbers within 1,000. The expressions in this activity give students a chance to use different strategies, such as subtracting hundreds from hundreds, tens from tens, and ones from ones, or adding up. Students may also use a variety of representations, which will be the focus of the activity synthesis. Students who choose to use base-ten blocks or number lines to represent their thinking use tools strategically (MP5).

This activity uses *MLR7 Compare and Connect.*
Advances: Representing, Conversing

Access for Students with Disabilities

Representation: Develop Language and Symbols. Synthesis: Invite students to explain their thinking orally instead of through a visual display.
Supports accessibility for: Social-Emotional Functioning and Fine Motor Skills

Instructional Routines

MLR7 Compare and Connect

Materials to Gather

Base-ten blocks, Tools for creating a visual display

Student-facing Task Statement

Find the value of each difference in any way that makes sense to you. Explain or show your reasoning.

1. $428 - 213$
2. $505 - 398$

Launch

- Groups of 2
- Give students access to base-ten blocks.
- "Take a minute to think about how you could subtract these numbers."
- 1 minute: quiet think time

3. $394 - 127$

Student Responses

1. 215. Sample response. I made 428 with the base-ten blocks. Then I took away 2 hundreds, 1 ten, and 3 ones. The blocks I had left showed 215.
2. 107: Sample response: I subtracted $505 - 400$ because 398 is so close to 400. This gave me 105. I had to give 2 back though because I was only subtracting 398, not 400. This made the answer 107.
3. 267: Sample responses:
   $127 + 3 = 130$
   $130 + 70 = 200$
   $200 + 100 = 300$
   $300 + 90 = 390$
   $390 + 4 = 394$
   $3 + 70 + 100 + 90 + 4 = 3 + 160 + 100 + 4 = 267$

- Share responses.

Activity

- "Work with your partner to subtract these numbers in any way that makes sense to you. Explain or show your reasoning."
- 5–7 minutes: partner work time
- Monitor for an expression for which students use a variety of representations, such as:
  - using base-ten blocks
  - drawing a number line
  - writing their reasoning in words
  - writing equations
- During the synthesis, students will create a visual display that shows how they found the value of the selected expression.
- Give each group tools for creating a visual display.

Synthesis

MLR7 Compare and Connect

- "Create a visual display that shows how you found the value of _____. You may want to include details such as notes, diagrams, drawings, and so on, to help others understand your thinking."
- 2–5 minutes: partner work time
- 5–7 minutes: gallery walk
- "What is the same and what is different about the ways that groups represented the subtraction?" (Some groups used equations. Some groups used base-ten blocks. They all used the same numbers. They all got the same answer.)
- Display one example of 2–3 different representations side-by-side for all to see.
- "Which representations show the same idea or help us find the difference the

same way?" (The number line and equations show the same idea of adding up. The base-ten blocks are different because they show a ten or a hundred decomposed into smaller units before some of the blocks are taken away.)

Activity 2

10 min

Base-ten Drawings

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to make sense of drawings of base-ten blocks. Students compare two base-ten drawings. The first drawing is the same as what they saw in grade 2, where the tens block is decomposed into 10 individual ones and moved over to the ones place before subtracting the ones. In the second drawing, the tens block is moved over and partitioned into 10 parts but not decomposed into individual ones. The subtraction of ones is shown directly on the ten that was moved over. Students then match base-ten diagrams to subtraction expressions and subtract to find the value of each expression. This will be helpful in later lessons when students relate base-ten diagrams to written algorithms.

Access for English Learners

MLR8 Discussion Supports. Synthesis: Some students may benefit from the opportunity to rehearse what they will say with a partner before they share with the whole class.
Advances: Speaking

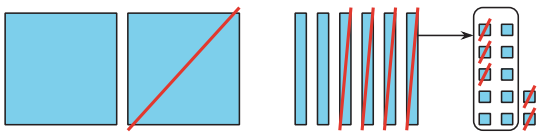
Student-facing Task Statement

1. Jada and Han made drawings to show how they used base-ten blocks to find the value of $262 - 135$. Their drawings are shown.

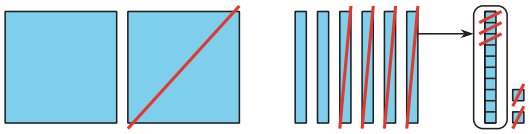
   Jada's drawing

Launch

- Groups of 2
- "Take a minute to look at the drawings of how Jada and Han used base-ten blocks to subtract."
- 1 minute: quiet think time



Han's drawing

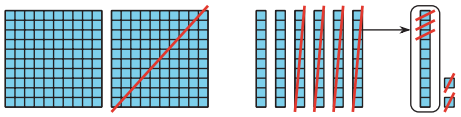


How are their drawings alike? How are they different?

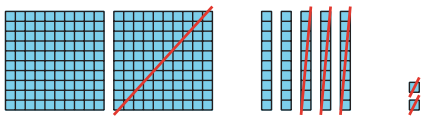
2. Here are three expressions, followed by three diagrams. Write each expression next to the diagram that represents it. Then, find the value of the expression.

$252 - 181$ $262 - 135$ $252 - 132$

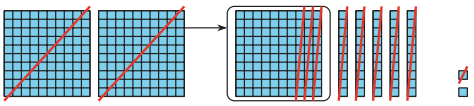
a.



b.



c.



Student Responses

1. Sample responses:
   - Alike: They both represent $262 - 135$. They both used a ten to get more ones so they could subtract 5 ones. Both ended up with 12 ones.
   - Different: Jada broke a ten into ten ones. Han did too, but he kept them together like a ten.

- "Discuss with your partner how Jada and Han's drawings are alike and how they are different."
- 1 minute: partner discussion
- Share responses.

Activity

- "Work together to match each expression with a diagram that represents it. Then, find the value of each expression."
- 3–5 minutes: partner work time

Synthesis

- Invite students to share the expression that matches each diagram.
- "What did you have to pay attention to as you matched each diagram to an expression?" (I had to look for the numbers that were being subtracted. I had to look for tens over by the ones and hundreds over by the tens if there weren't enough tens or ones.)

2. a. $262 - 135$, which is 127.
   b. $252 - 132$, which is 120.
   c. $252 - 181$, which is 71.

Lesson Synthesis

10 min

"Today we subtracted numbers using many different strategies. What is your favorite representation to use to subtract numbers?" (I like to use base-ten blocks so I can see the numbers I am subtracting. I like to write equations because it shows me how I am subtracting the numbers.)

"Does the way you subtract numbers or the representation you use change based on the numbers in the problem?" (Yes, I use mental math when I see that one of the numbers is close to a hundred. No, I always add up. I always like to use base-ten blocks.)

"Keep all these strategies in mind as we learn new ways to show our reasoning around subtraction in the upcoming lessons."

Suggested Centers

- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)

Complete Cool-Down

Response to Student Thinking

Students make a minor mistake carrying out their strategy.

Next Day Support

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

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

Prior Unit Support

Grade 2, Unit 7, Section C: Subtract within 1,000 using Place Value Strategies

Lesson 8: Subtraction Algorithms (Part 1)

Standards Alignments

Addressing 3.NBT.A.2

Teacher-facing Learning Goals

- Relate base-ten diagrams to written algorithms for subtraction.

Student-facing Learning Goals

- Let's learn a new way to subtract.

Lesson Purpose

The purpose of this lesson is for students to use their knowledge of base-ten diagrams to make sense of a written subtraction algorithm.

In previous lessons, students revisited subtraction within 1,000 using strategies based on place value, properties of operations, and the relationship between addition and subtraction. In this lesson, students are introduced to a subtraction algorithm that clearly shows the subtraction of ones from ones, tens from tens, and hundreds from hundreds, and is similar to one of the initial addition algorithms in a prior lesson. Students should have access to base-ten blocks as needed.

Access for:

Students with Disabilities

- Engagement (Activity 2)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Card Sort (Activity 2), Number Talk (Warm-up)

Materials to Copy

- Diagrams and Algorithms (groups of 2): Activity 2

Lesson Timeline

Warm-up	10 min
Activity 1	15 min

Teacher Reflection Question

Reflect on how comfortable your students are asking questions of you and of each other. What can you do to encourage students to ask questions?

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

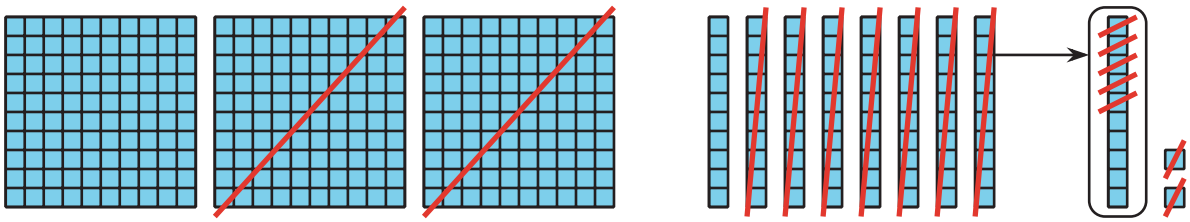
Connect a Diagram and an Algorithm

Standards Alignments

Addressing 3.NBT.A.2

Student-facing Task Statement

Explain how the diagram matches the algorithm.



$$\begin{array}{rrcrcr} & & & {\scriptstyle 70} & & {\scriptstyle 12} \\ & 300 & + & \cancel{80} & + & \cancel{2} \\ - & 200 & + & 60 & + & 7 \\ \hline & 100 & + & 10 & + & 5 \end{array}$$

Student Responses

Sample response: I can see that there are 3 hundreds, 8 tens, and 2 ones, but one of the tens has been moved over to get more ones. In the algorithm, the 80 and 2 are crossed out to show this. The blocks that are not crossed out show the $100 + 10 + 5$ in the algorithm.

Begin Lesson

Warm-up

10 min

Number Talk: Subtraction Strategies

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this Number Talk is to elicit strategies students have for subtracting within 1,000. These understandings help students develop fluency and will be helpful later when students choose between using an algorithm or another strategy to subtract.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $100 - 98$
- $101 - 99$
- $200 - 98$
- $204 - 98$

Student Responses

- 2: I counted up from 98 to 100 and called out only 2 numbers, so the answer is 2.
- 2: I counted up from 99 to 101 and called out only 2 numbers, so the answer is 2. I saw that both numbers in the subtraction expression just went up by 1 from the first expression, but the difference is still 2.
- 102: This is like the first expression, but I counted up 2 to get to 100, and it's up 100 to get to 200, so the difference is 102.
- 106: I counted up 2 to get to 100, then 100 to get to 200, and 4 more to get to 204. Altogether I counted up 106. It's like the third expression, but the 200 went up 4 more, so the difference would be 4 more, so it's 106.

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

- "How did the first couple of expressions help you find the value of later expressions?" (When I noticed that the numbers had adjusted a little, it was easy to adjust the difference the same way. Sometimes it looked like a new problem, but both of the numbers had gone up the same amount so the difference was the same.)
- 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 problem in a different way?"
- "Does anyone want to add on to _____'s strategy?"

Activity 1

15 min

From Drawings to an Algorithm

Standards Alignments

Addressing 3.NBT.A.2

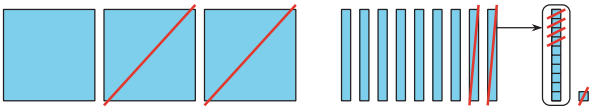
The purpose of this activity is for students to use their knowledge of base-ten diagrams and place value to make sense of a subtraction algorithm. Students notice that in both the base-ten drawing and the algorithm, the subtraction happens by place. We can find the difference of two numbers by subtracting ones from ones, tens from tens, and hundreds from hundreds, and adding these partial differences to find the overall difference.

Students also recall that sometimes a place value unit needs to be decomposed before subtracting. For example, a ten may first need to be decomposed into 10 ones. This decomposition can be seen in both the base-ten drawing and in the algorithm. In the synthesis, students interpret the work and reasoning of others (MP3).

Student-facing Task Statement

Jada and Kiran found the value of $391 - 215$. Their work is shown.

Jada's drawing



Kiran's algorithm

Launch

- Groups of 2
- Display Jada's drawing.
- "Jada and Kiran found the value of $391 - 215$. Take a minute to make sense of Jada's drawing."
- 1–2 minutes: quiet think time
- Share responses.

Activity

- "Work with your partner to make sense of

$$\begin{array}{rrrrrr} & & & 80 & & 11 \\ & 300 & + & \cancel{90} & + & \cancel{1} \\ - & 200 & + & 10 & + & 5 \\ \hline \end{array}$$

1. Explain how Kiran's algorithm starts.
2. Explain how Kiran recorded the decomposition of the ten into more ones.
3. Finish Kiran's work.

Student Responses

1. Sample response: Kiran wrote the numbers he was subtracting as a sum of hundreds, tens, and ones. Then he saw he needed more ones, so he decomposed a 10 into more ones.
2. Sample response: Kiran crossed out the 90 and wrote 80 above it. Then he crossed out the 1 and wrote 11 above that because he had 10 more ones after he decomposed a 10.
3. $100 + 70 + 6$

Kiran's algorithm and complete the questions about his work."

- 5-7 minutes: partner work time

Synthesis

- Invite students to share their responses.
- "How did Kiran know to rewrite 391?" (If he tried to subtract the ones, he would notice he doesn't have enough, so he needs to decompose a ten into 10 ones.)
- "Why is he allowed to rewrite $300 + 90 + 1$ as $300 + 80 + 11$?" (Both of these add up to 391. They're both showing 391 in different ways.)
- "How is Kiran's reasoning like Jada's reasoning?" (Both of them decomposed the numbers into hundreds, tens, and ones, and subtracted the numbers in each place separately. Both of them decomposed a ten into 10 ones.)
- "How is their reasoning different?" (Jada used base-ten drawings to represent the numbers and Kiran wrote them out in expanded form.)
- "How did you finish Kiran's work?" (I subtracted the ones, the tens, and then the hundreds. I subtracted the hundreds, the tens, and then the ones.)
- Record Kiran's completed algorithm and keep it posted throughout this lesson and the following lesson.

Advancing Student Thinking

If students don't explain the written algorithm, consider asking:

- "How did each student subtract?"
- "How could Jada's drawing help us understand Kiran's work?"

Activity 2

20 min

Card Sort: Diagrams and Algorithms

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to analyze the connections between algorithms and base-ten diagrams that represent subtraction. In particular, students relate how the two strategies show a hundred decomposed into tens and a ten into ones in order to facilitate subtraction.

As students work, encourage them to refine their descriptions of what is happening in both the diagrams and the algorithms using more precise language and mathematical terms (MP6).

Access for English Learners

MLR8 Discussion Supports. Students should take turns finding a match and explaining their reasoning to their partner. Display the following sentence frames for all to see: "I noticed _____ , so I matched . . . ." Encourage students to challenge each other when they disagree.
Advances: Listening, Speaking, Representing

Access for Students with Disabilities

Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce remaining cards once students have completed their initial set of matches.
Supports accessibility for: Organization, Social-Emotional Functioning

Instructional Routines

Card Sort

Materials to Copy

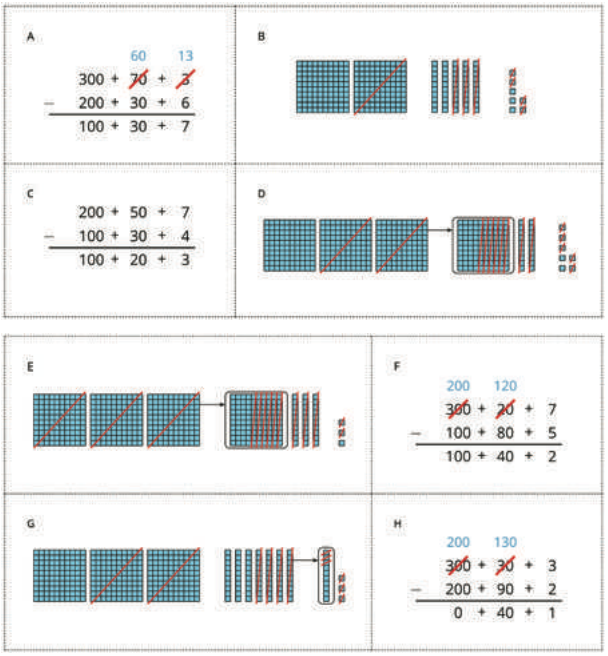
Diagrams and Algorithms (groups of 2)

Required Preparation

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

Student-facing Task Statement

Your teacher will give you a set of cards. Match each diagram with an algorithm.



Student Responses

A and G
B and C
D and F
E and H

Sample response: I know that A and G match because I see the 3 hundreds and 2 crossed out to show you're subtracting 2 hundreds. I also see 73, but one of the tens was moved over by the ones because there weren't enough ones to subtract 6. That's why there's a 60 and a 13 instead of 70 and 3.

Launch

- Groups of 2
- Distribute one set of pre-cut cards to each group of students.

Activity

- "This set of cards includes base-ten diagrams and algorithms that represent the same subtraction. Match each diagram to an algorithm. Work with your partner to explain your choices."
- 8 minutes: partner work time

Synthesis

- Select 2–3 students to share a match they made and how they know the cards go together.
- "In the diagrams, why were the hundreds sometimes moved over into the tens place?" (This happened when there weren't enough tens to subtract. We used a hundred to get more tens.)
- "How was this shown in the algorithm?" (A hundred was crossed out and 10 more tens were added to the tens place, like in F, 20 was crossed out and 120 was written above it.)

Lesson Synthesis

10 min

Display a completed algorithm for addition that uses expanded form and a completed algorithm for subtraction that uses expanded form, such as:

$$\begin{array}{rrrrrr} & 300 & + & 30 & + & 7 \\ + & 200 & + & 30 & + & 6 \\ \hline & 500 & + & 60 & + & 13 \end{array}$$

$$\begin{array}{rrrrrr} & & & 60 & & 13 \\ & 500 & + & \cancel{70} & + & \cancel{3} \\ - & 200 & + & 30 & + & 6 \\ \hline & 300 & + & 30 & + & 7 \end{array}$$

"Today we learned an algorithm for subtraction. How is this algorithm similar to the algorithm we used for addition? How is it different?" (Both of the algorithms use expanded form. With both of them, you have to compose the parts of the number at the end to get the answer. In the addition algorithm, there's a ten being composed, but in the subtraction algorithm, it's being decomposed to get more ones. The new ten is recorded below in the addition algorithm, but when you decompose a ten for subtracting, it's recorded above the numbers.)

Suggested Centers

- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)
- Five in a Row: Multiplication (3–5), Stage 2: Factors 1–9 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students do not explain the decomposition of a 10 into 10 ones.

Next Day Support

- During the launch of the next day's activity, have students discuss how the diagram matches the algorithm, specifically how the decomposition of the ten into 10 ones is recorded.

Lesson 9: Subtraction Algorithms (Part 2)

Standards Alignments

Building On	2.NBT.B.7
Addressing	3.NBT.A.2
Building Towards	3.NBT.A.2

Teacher-facing Learning Goals

- Analyze and use a subtraction algorithm with the numbers written in expanded form.

Student-facing Learning Goals

- Let's learn more about our first subtraction algorithm.

Lesson Purpose

The purpose of this lesson is for students to subtract within 1,000 using a subtraction algorithm that records numbers in expanded form.

Previously, students learned to record subtraction using an algorithm in which the numbers are written in expanded form. They made connections between the structure and steps of the algorithm to those of base-ten diagrams that represent the same subtraction. In this lesson, students take a closer look at the algorithm and use it to find differences. They also examine a common error in subtracting numbers when decomposition of a place value unit is required. When students discuss shown work, they construct viable arguments and critique the reasoning of others (MP3).

Access for:

Students with Disabilities

- Engagement (Activity 2)

English Learners

- MLR8 (Activity 2)

Instructional Routines

True or False (Warm-up)

Materials to Gather

- Base-ten blocks: 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

Today students were able to analyze a common error when subtracting within 1,000 before they used an algorithm to subtract. How did the analysis of the error affect their work with subtracting within 1,000?

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

5 min

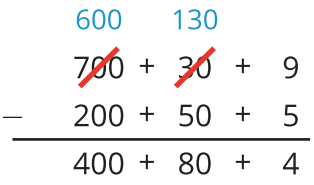
How Did Andre Subtract?

Standards Alignments

Addressing 3.NBT.A.2

Student-facing Task Statement

Andre found the value of $739 - 255$. His work is shown.



Explain how he subtracted and the value he found for $739 - 255$.

Student Responses

Sample response: First, Andre wrote 739 and 255 in expanded form and stacked them. Then, he subtracted 5 from 9 and got 4. Then, he realized he didn't have enough tens to subtract 50 from 30 so he decomposed a 100 from the 700 into 10 tens to get 130. 130 minus 50 is 80 and 600 minus 200 is 400. His answer is 484.

Begin Lesson

Warm-up

10 min

True or False: Does It Commute?

Standards Alignments

Building On	2.NBT.B.7
Building Towards	3.NBT.A.2

The purpose of this True or False is to elicit insights students have about how the commutative property applies to addition and multiplication, but not subtraction. The reasoning students do here helps to deepen their understanding of the properties of operations and how they apply to subtracting within 1,000. It will also be helpful later when students need to recognize the need to decompose hundreds or tens to get more tens or ones.

Instructional Routines

True or False

Student-facing Task Statement

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

- $4 \times 5 = 5 \times 4$
- $125 + 200 = 200 + 125$
- $300 - 100 = 100 - 300$

Student Responses

- True. Sample response: Both products are 20. It doesn't matter if we change the order of the factors, as the product is the same.
- True. Sample response: Both sides of the equal sign add up to 325. Rearranging the numbers being added doesn't change the sum.
- False. Sample response: We don't have enough on the right side to take away 300.

Launch

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

Activity

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

Synthesis

- "What is different about the last equation?" (If we switch the order in subtraction, then both sides of the equal side aren't the same. If we switch the order when we subtract, we don't get the same number.)
- Consider asking:
  - "Who can restate _____'s reasoning in a different way?"
  - "Does anyone want to add on to _____'s

reasoning?"

- "Can we make any generalizations based on the statements?"

Activity 1

15 min

Revise Subtraction Work

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to examine an error in an algorithm in which a larger digit is subtracted from a smaller digit in the same place value position. In such a case, it is common for students to subtract the smaller digit from the larger digit instead, not realizing that subtraction is not commutative. The given algorithm here shows the numbers in expanded form to help students see that it is necessary to first decompose a hundred into tens before the 50 can be subtracted from 20.

When students make sense of and correct Lin's mistake, they construct viable arguments and critique the reasoning of others (MP3).

Materials to Gather

Base-ten blocks

Student-facing Task Statement

Lin's work for finding the value of $428 - 156$ is shown.

$$\begin{array}{rr} & 400 + 20 + 8 \\ - & 100 + 50 + 6 \\ \hline & 300 + 30 + 2 \end{array}$$

1. What error do you see in Lin's work?
2. What would you tell or show Lin so she can revise her work?

Launch

- Groups of 2
- Give students access to base-ten blocks.
- Display the image of Lin's work.
- "Now let's look at how Lin subtracted 156 from 428. Take a minute to examine what she did."
- 1–2 minutes: quiet think time

Activity

- "Work with your partner to describe the

Student Responses

1. She didn't really take 50 away from the 428. She didn't have enough tens so she just subtracted $50 - 20$ instead of $20 - 50$, which isn't the same thing.
2. I would cross out the 400 and write 300 to show that I decomposed one of the hundreds to make more tens. Then I would record 120 above the 20 to show that I had 12 tens. Then subtract.

mistake and what you would tell or show Lin so she can revise her work."

- 5 minutes: partner work time
- Monitor for students who:
  - use base-ten blocks or an algorithm to make sense of Lin's mistake
  - decompose a hundred into 10 tens before subtracting 50 from 20, and showing this process by exchanging base-ten blocks or rewriting 400 as $300 + 100$ and combining the 100 with 20
- Identify students who used these strategies and select them to share during synthesis.

Synthesis

- "How would you describe Lin's mistake?" (She tried to subtract 20 from 50 when you're subtracting 50 from 20. She needed to decompose a hundred to get more tens.)
- Select previously identified students to share what they would tell or show Lin so she can revise her work.
- If no students suggest the following revision to Lin's work, display the algorithm and ask students to explain the revision:

$$\begin{array}{rccccc} & 300 & & 120 & & \\ & \cancel{400} & + & \cancel{20} & + & 8 \\ - & 100 & + & 50 & + & 6 \\ \hline & 200 & + & 70 & + & 2 \end{array}$$

- "Keep Lin's mistake in mind as we practice using this subtraction algorithm in the next activity."

Advancing Student Thinking

If students don't mention the error in Lin's work, consider asking:

- "What mistake did Lin make when subtracting?"

- "How could we use base-ten blocks to help Lin revise her work?"

Activity 2

20 min

Try the Algorithm

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to practice using the subtraction algorithm introduced in a previous lesson. Provide base-ten blocks for students who choose to use them to support their reasoning about the algorithm.

Access for English Learners

MLR8 Discussion Supports: Synthesis: Before students share their reasoning, remind them to use words such as decompose, ones, tens, and hundreds.
Advances: Speaking, Representing

Access for Students with Disabilities

Engagement: Provide Access by Recruiting Interest. Leverage choice around perceived challenge. Invite students to select at least 3 of 5 problems to complete.
Supports accessibility for: Organization, Attention, Social-emotional skills

Materials to Gather

Base-ten blocks

Student-facing Task Statement

Here is a subtraction algorithm you saw in an earlier lesson:

Launch

- Groups of 2
- Display Kiran's algorithm from the previous lesson.
- "Here's a subtraction algorithm you saw in an earlier lesson. What might be the first

$$\begin{array}{rrrrrr} & & 80 & & 11 \\ & 300 & + & \cancel{90} & + & \cancel{1} \\ - & 200 & + & 10 & + & 5 \\ \hline \end{array}$$

Try using this algorithm to find the value of each difference. Show your reasoning. Organize it so it can be followed by others.

1. $283 - 159$
2. $425 - 192$
3. $639 - 465$
4. $591 - 128$
5. $832 - 575$

Student Responses

1. 124 or $100 + 20 + 4$
2. 233 or $200 + 30 + 3$
3. 174 or $100 + 70 + 4$
4. 463 or $400 + 60 + 3$
5. 257, or an algorithm showing $200 + 50 + 7$

$$\begin{array}{rrrrrr} & & 120 & & \\ & 700 & \cancel{20} & & 12 \\ & \cancel{800} & + \cancel{30} & + & \cancel{2} \\ - & 500 & + 70 & + & 5 \\ \hline & 200 & + 50 & + & 7 \end{array}$$

thing you'd do if you are to use this algorithm to find the value of the subtraction expressions in the activity?" (Write the numbers in expanded form and stack them.)

- 1 minute: quiet think time
- Share responses.
- Give students access to base-ten blocks.

Activity

- "Take some quiet time to try this algorithm. Check in with your partner if you have questions."
- 5–7 minutes: independent work time
- If students have questions about the notation used to record the decomposition of a hundred or ten into more tens or ones, consider asking:
  - "Is there any place in the problem where you don't have enough tens or ones?"
  - "How could you get more tens (or ones)?"
  - "How could you record a hundred being decomposed into 10 tens (or a ten decomposed into 10 ones)?"

Synthesis

- Select students to share their reasoning for 2–3 problems. Choose problems to focus on based on common questions that came up. Be sure to discuss the last problem, which requires decompositions of both a ten and a hundred.
- For the last problem, ask: "How did you decide how to record the ten and hundred that needed to be decomposed?" (I started subtracting the ones and decomposed a ten into 10 ones so I had already crossed off the 30 and written 20. When I decomposed the hundred into tens, I just

decided to write the 120 on top of the 20 like I wrote the 20 on top of the 30.)

- Record the completed algorithm, showing the decompositions of tens and hundreds.
- Consider asking:
  - "Where were there not enough tens or ones to subtract?"
  - "What was decomposed and how was it recorded?"
  - "Did you notice any places where you might have made the error we saw in Lin's work?"

Advancing Student Thinking

If students do not record the multiple decompositions in the last problem, consider asking:

- "What units did you need to decompose in this problem?"
- "Where would it make the most sense to you to record how you decomposed a hundred into more tens? A ten into more ones?"

Lesson Synthesis

10 min

Display student work from a problem in the second activity, such as:

$$\begin{array}{rccccccc} & & & 120 & & & \\ & 700 & & \cancel{20} & & 12 & \\ & \cancel{800} & + & \cancel{30} & + & \cancel{2} & \\ - & 500 & + & 70 & + & 5 & \\ \hline & 200 & + & 50 & + & 7 & \end{array}$$

"Suppose a classmate says this problem has been changed into a completely different problem because the 832 has been crossed out. How would you explain the crossed-out numbers to them?" (The 832 is still there. It's just been reorganized as 700 plus 120, which is 820, and then 820 plus 12 is 832. So, it's still 832. It's been grouped differently so we can subtract in every place value.)

Suggested Centers

- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)
- Five in a Row: Multiplication (3–5), Stage 2: Factors 1–9 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students do not explain the decomposition of a hundred into 10 tens.

Next Day Support

- Use the warm-up of the next day's lesson to have students consider when they would have to decompose a hundred into more tens.

Lesson 10: Subtraction Algorithms (Part 3)

Standards Alignments

Addressing 3.NBT.A.2

Teacher-facing Learning Goals

- Relate subtraction algorithms to one another using place value understanding.
- Subtract numbers within 1,000 using another algorithm based on place value.

Student-facing Learning Goals

- Let's learn another algorithm to subtract.

Lesson Purpose

The purpose of this lesson is for students to use a subtraction algorithm that records a single digit for the difference between the numbers in each place value position and a condensed notation for a decomposed hundred or ten.

In this lesson, students continue to learn how to use algorithms to subtract within 1,000. The new algorithm in this lesson draws attention to how place value can be used to record less digits in each place value position. This condensed notation also changes the steps of the algorithm because students don't write the numbers in expanded form to start or add up the partial differences at the end.

Access for:

Students with Disabilities

- Representation (Activity 2)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Notice and Wonder (Warm-up)

Materials to Gather

- Base-ten blocks: Warm-up

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

Who got to do math today in class and how do you know? Identify the norms or routines that allowed these students to engage in mathematics. How can you adjust these norms and routines so all students do math tomorrow?

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

5 min

Choose the Method

Standards Alignments

Addressing 3.NBT.A.2

Student-facing Task Statement

Use an algorithm of your choice to find the value of $419 - 267$.

Student Responses

152. Students can use either of the subtraction algorithms learned so far.

Begin Lesson

Warm-up

10 min

Notice and Wonder: Digits that Disappear

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this warm-up is to elicit the observation that a hundred that has been decomposed into more tens can be recorded using a condensed notation, which will be useful later in the lesson when

students decompose hundreds and tens to facilitate subtraction. While students may notice and wonder many things about these numbers, how the decomposition is recorded is the important discussion point. Base-ten blocks or diagrams can be used during the discussion if students need additional support in making sense of the condensed notation.

Instructional Routines

Notice and Wonder

Materials to Gather

Base-ten blocks

Student-facing Task Statement

What do you notice? What do you wonder?

Student Responses

Students may notice:

- On the left is 325 written in expanded form. On the right is 325 written the regular way.
- Parts of the expression on the left are crossed out. The first two digits in the number on the right are crossed out.
- Both the expression and the number 325 have smaller numbers or digits written above them.
- The expression on the left shows 120 and the number on the right shows 12 in the tens place.
- The expression on the left shows 200 and the number on the right shows 2 for the hundreds.
- Both the expression and the number shows a hundred decomposed into 10 tens and then added to the 2 tens that were already there.

Students may wonder:

- Why are parts of the expression and the

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

- "Both the expression in expanded form and the number show a unit being decomposed into smaller units. Where do you see this happening in each case?" (The 300 has been turned into 200 in both examples. The 200 is shown with 200 in the first example, but just a 2 in the second example. The 2 tens has been turned into 12 tens in both examples. The 12 tens is shown as 120 in the first example, but just a 12 in the tens place in the second example.)

number crossed out?

- What do the little numbers and the little digits represent?
- Why would we write a number like shown on the right?
- How is this related to what we did yesterday?

Activity 1

20 min

A New Subtraction Algorithm

PLC Activity

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to learn a subtraction algorithm that records the difference in each place value position as a single digit. The algorithm also records a decomposed hundred as a single digit in the hundreds place and as two digits in the tens place. Students carefully analyze and discuss two different ways to subtract, highlighting similarities and differences and explaining how and why they work (MP6).

Student-facing Task Statement

Andre and Clare found the value of $528 - 271$. How they started their work is shown.

Andre's algorithm

$$\begin{array}{rrcrcr} & \overset{400}{\cancel{500}} & + & \overset{120}{\cancel{20}} & + & 8 \\ - & 200 & + & 70 & + & 1 \\ \hline \end{array}$$

Clare's algorithm

$$\begin{array}{r} \overset{4}{\cancel{5}}\ \overset{12}{\cancel{2}}\ 8 \\ -\ 2\ 7\ 1 \\ \hline \end{array}$$

1. Complete both algorithms to find the difference.
2. Andre and Clare started their subtraction in different ways. How did their way of starting

Launch

- Groups of 2
- Display Andre and Clare's work.
- "How are the two algorithms alike?" (They are both stacked vertically. They show the same two numbers, 528 and 271. They both show a hundred decomposed into 10 tens.)
- "How are they different?" (One pair of numbers is written in expanded form, but the other pair is not. In Andre's case, the decomposing of a hundred is recorded as 400 and 120. In Clare's case, it is written as 4 in the hundreds place and 12 in the tens place.)

affect the steps needed to find the difference?

Student Responses

1. $200 + 50 + 7$ and 257
2. Sample responses:
    - For Andre's way of getting started, I had to write part of the expanded form for each step. For Clare's way of getting started, I only recorded one digit for each place value.
    - For Andre's way of getting started, I had to add up the parts of the number at the end, but for Clare's way, the number was already made from the digits.

- 1 minute: quiet think time
- 2 minutes: partner discussion
- Share and record responses. Emphasize the different ways of recording the decompositions.
- "We noticed that this new algorithm uses fewer digits by not writing out the value of each digit. We just record up to 2 digits in each place to tell how many hundreds, tens, or ones there are."

Activity

- "Take a few quiet minutes to work on the activity. Afterward, discuss your responses with your partner."
- 3–5 minutes: independent work time
- 2–3 minutes: partner discussion

Synthesis

- Invite students to share their work for completing each algorithm.
- "What did you do differently as you completed each of these problems?" (With Andre's work I subtracted all the place values, then I had to add up all the parts of the difference. With Clare's work once I subtracted the digits in each place value, the answer was complete.)

Activity 2

15 min

Try Clare's Algorithm

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to practice using the algorithm they learned in the previous activity, in which the difference in each place value position is recorded with one digit and the decomposition of a place value unit is recorded using one or two digits.

Access for English Learners

MLR8 Discussion Supports. Display sentence frames to support partner discussion: "First, I _____ because . . . .", and "Then, I _____ because . . . ."
Advances: Speaking, Listening

Access for Students with Disabilities

Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were most important/needed to solve the problems. Display the sentence frame: "The next time I subtract using Clare's algorithm, I will look for . . . ."
Supports accessibility for: Conceptual Processing

Student-facing Task Statement

Clare used an algorithm to find the value of $538 - 156$.

$$\begin{array}{r} {\scriptstyle 4\ 13} \\ 5\ \not{3}\ \not{8} \\ -\ 1\ 5\ 6 \\ \hline 3\ 8\ 2 \end{array}$$

Try using her algorithm to find the value of each difference.

1. $691 - 358$
2. $926 - 584$
3. $317 - 182$
4. $492 - 325$

Student Responses

1. 333
2. 342
3. 135
4. 167

Launch

- Groups of 2
- "Now let's try using the algorithm you learned in the last activity to subtract some numbers. You can use the steps you recorded from our last activity or use Clare's work as an example."

Activity

- 3–5 minutes: independent work time
- "Share your work and solutions with your partner."
- 2–3 minutes: partner discussion

Synthesis

- Display student work on the first expression.
- "Where do we see the 91 after the 9 and the 1 have been crossed out?" (The 8 and the 11 represents 80 and 11, which is 91.)

Lesson Synthesis

10 min

Display Andre and Clare's work from the first activity.

"How did place value allow us to use fewer digits when recording newly decomposed hundreds or tens?" (We knew what place each digit is in and what value each digit has. We knew the 4 stood for 400, and the 12 stood for 12 tens or 120.)

Suggested Centers

- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)
- Five in a Row: Multiplication (3–5), Stage 2: Factors 1–9 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students find the difference, but do not use an algorithm from the lesson.

Next Day Support

- During the launch of the next day's activity, have students recap the important points of the previous lessons.

Lesson 11: Analyze Subtraction Algorithms

Standards Alignments

Addressing 3.NBT.A.2

Teacher-facing Learning Goals

- Analyze different steps in subtraction algorithms and reason about when certain steps might be more productive.

Student-facing Learning Goals

- Let's think about subtraction algorithms in more detail.

Lesson Purpose

The purpose of this lesson is for students to consider subtraction algorithms in more detail, with a focus on decomposing as needed and on cases when it is necessary to decompose multiple units to subtract across zeros.

In a previous lesson, students used a subtraction algorithm in which single digits were used to record the result of subtraction in any place value position and one or two digits were used to record any decompositions. They did any necessary decompositions before beginning to subtract. In this lesson, students make sense of and use an algorithm in which subtraction begins with the ones, decomposing units as needed as they work from right to left. Students also consider a case in which it is necessary to decompose a hundred and a ten in order to get more ones because there is a zero in the tens place.

Access for:

Students with Disabilities

- Engagement (Activity 1)

English Learners

- MLR8 (Activity 1)

Instructional Routines

Number Talk (Warm-up)

Lesson Timeline

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

Teacher Reflection Question

How did your students use their prior understanding of subtracting with an algorithm to solve problems in which they have to decompose place value units across zeros?

Lesson Synthesis	10 min
Cool-down	5 min

Cool-down (to be completed at the end of the lesson) 5 min

Subtraction Reflection

Standards Alignments

Addressing 3.NBT.A.2

Student-facing Task Statement

You've learned many ways to subtract large numbers, including strategies and algorithms.

1. What is your favorite way to subtract large numbers?
2. What's a way that you would like to learn more about and use more?

Student Responses

Sample response:

1. I like to count back by place value.
2. I am still learning to use an algorithm in which I first write the numbers as a sum of hundreds, tens, and ones.

Begin Lesson

Warm-up 10 min

Number Talk: Subtract within 1,000

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this Number Talk is to elicit strategies and understandings students have for

subtracting multi-digit numbers. These understandings help students develop fluency and will be helpful later in a subsequent lesson when students are to use strategies flexibly to subtract within 1,000.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $400 - 200$
- $450 - 200$
- $450 - 205$
- $450 - 215$

Student Responses

- 200: I knew that 4 hundreds subtracted by 2 hundreds is 2 hundreds.
- 250: This problem is just like the first one but there are 5 tens left over. So, $400 - 200$ is 200, plus 50 is 250.
- 245: I subtracted the 2 hundreds first, and $450 - 200 = 250$. Then I subtracted the ones and $250 - 5$ is 245.
- 235: This is just like the third problem, but I had to subtract 10 more, and $245 - 10 = 135$.

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

- "How did place value help as you subtracted these numbers?" (I subtracted hundreds from hundreds, tens from tens, and ones from ones. I was able to think about each place value position separately, which helped me find the difference.)
- 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 problem in a different way?"
    - "Does anyone want to add on to _____'s strategy?"

Activity 1

20 min

Compare Two Subtraction Algorithms

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to consider two subtraction algorithms. In the first algorithm, students first look for any place value units where they need to decompose to get more units, then subtract right to left. In the second algorithm, subtraction occurs right to left, and units are decomposed as the need arises. Students try each algorithm and consider potential advantages and disadvantages of each algorithm.

In the synthesis, students carefully analyze and discuss the two algorithms, explaining the motivation behind them and how they are the same and different (MP3, MP6).

Access for English Learners

MLR8 Discussion Supports.
Synthesis: For each idea that is shared, invite students to turn to a partner and restate what they heard using precise mathematical language.

Access for Students with Disabilities

Engagement: Develop Effort and Persistence. Some students may benefit from feedback that emphasizes effort, and time on task. For example, check in with students after completing the problem using the first algorithm.
Supports accessibility for: Attention

Student-facing Task Statement

1. The first steps of two algorithms are shown.

Algorithm A, step 1

$$\begin{array}{r} {\scriptstyle 4\ 10} \\ 5\ \cancel{0}\ 8 \\ -\ 1\ 5\ 6 \\ \hline \end{array}$$

Algorithm B, step 1

$$\begin{array}{r} 5\ 0\ 8 \\ -\ 1\ 5\ 6 \\ \hline 2 \end{array}$$

Launch

- Groups of 2
- Display the image.
- "The first steps of two subtraction algorithms are shown. Take a minute to think about how they are different."
- 1 minute: quiet think time

How are the steps different?

2. Use each algorithm to find the value of $824 - 541$.

Student Responses

1. In the first algorithm, the first step is decomposing one of the hundreds into 10 tens. In the second algorithm, the first step is subtracting the ones. Each algorithm will look the same at the end.
2. 283

Activity

- "Discuss how the steps are different in each algorithm with your partner."
- 2 minutes: partner discussion
- Share and record responses.
- "Work with your partner to finish each algorithm."
- 2–3 minutes: partner work time
- "Now work with your partner to use both algorithms to subtract 541 from 824."
- 5–7 minutes: partner work time

Synthesis

- Select students to share how they used both algorithms to find the value of $824 - 541$.
- Keep algorithms from the first problem displayed.
- "Even though the algorithms may look the same after a few steps, they started out differently. Think about advantages and disadvantages of using each algorithm."
- 1 minute: quiet think time
- "Now, discuss the advantages and disadvantages of each algorithm with your partner."
- 1 minute: partner discussion
- Invite students to share advantages and disadvantages they come up with. (In algorithm 1, I look for decompositions first, so I probably won't mix up the order of subtracting. In algorithm 1, I could subtract left to right or right to left. In algorithm 2, I can start subtracting right away. That means I don't have to worry about decomposing until I know I need to do it.)

Activity 2

15 min

Use an Algorithm?

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to make sense of an algorithm in which a number with non-zero digits is subtracted from a number with a zero in the tens place. In the given problem, it is necessary to decompose a larger unit to have enough ones to subtract. There are no tens to decompose, however, prompt students to consider whether subtraction is possible, and if so, how it could be done.

When students make sense of Elena's reasoning, they construct viable arguments and critique the reasoning of others (MP3).

Student-facing Task Statement

Noah wanted to find the value of $301 - 167$ and wrote:

$$\begin{array}{r} 3\ 0\ 1 \\ -\ 1\ 6\ 7 \\ \hline \end{array}$$

Elena said that we can't subtract this way because we would need more ones to subtract 7 ones, but there's a zero in the tens place of 301.

1. Do you agree with Elena's statement? Explain your reasoning.
2. Show how you would use an algorithm (either Noah's or another algorithm) to find the difference between 301 and 167.

Student Responses

1. Sample response: I agree there are no ones

Launch

- Groups of 2
- "Take a minute and look over Noah's work and what Elena says about it."
- 1 minute: quiet think time

Activity

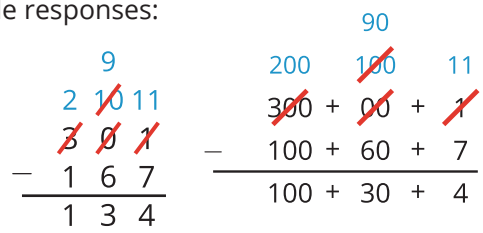
- "Now, work with your partner to complete the activity."
- 5–7 minutes: partner work time
- Monitor for a student who shows how the problem could be completed with decomposing a hundred into tens, then decomposing a ten into more ones.

Synthesis

- Select students to share their responses.
- Display student work that shows a hundred decomposed into tens, then a ten

in the tens place, but we can decompose a hundred to make 100 ones. I disagree that we can't use what Noah set up.

2. Sample responses:



decomposed into ones (or show the example in Student Responses).

- "How does the work here show that we could have enough ones to subtract even though there is 0 in the tens place of 301?" (Crossing out the 3 in the hundreds and writing 10 in the tens place shows a hundred decomposed to get tens. Crossing out the 10 and writing a 9 in the tens place and writing 11 in the ones place shows a ten decomposed to get ones.)

Lesson Synthesis

10 min

- "We've learned different algorithms for subtracting. Which subtraction algorithm is your favorite and why?" (The expanded form algorithms because we can really see all the parts of the number. The algorithm where we decompose the units as we go because I don't like to do them all at once. The algorithms that use 1 digit for each place value because they don't take as long to write.)

Suggested Centers

- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)
- Five in a Row: Multiplication (3–5), Stage 2: Factors 1–9 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students note ways to subtract that they would like to learn more about.

Next Day Support

- Pair students up before the warm-up to discuss their responses.

Lesson 12: Subtract Strategically

Standards Alignments

Addressing	3.NBT.A.2, 3.OA.B.5
Building Towards	3.OA.C.7

Teacher-facing Learning Goals

- Subtract within 1,000 using algorithms or other strategies based on the numbers in the problem.

Student-facing Learning Goals

- Let's consider when to use algorithms and when to use other strategies to subtract.

Lesson Purpose

The purpose of this lesson is for students to consider when they might use algorithms or other strategies to subtract.

Students have learned several subtraction algorithms in prior lessons. Now students take time to consider when it makes sense to use an algorithm and when it makes sense to use another strategy, such as those learned in grade 2. Students will consider how thinking about the numbers in the problem can help them use their knowledge of subtraction to flexibly subtract within 1,000.

This lesson has a Student Section Summary.

Access for:

Students with Disabilities

- Engagement (Activity 1)

English Learners

- MLR8 (Activity 1)

Instructional Routines

Number Talk (Warm-up)

Materials to Gather

- Paper clips: Activity 2
- Pencils: Activity 2

Materials to Copy

- Greatest Difference, Smallest Difference (groups of 2): 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

Reflect on your experience with the Number Talks 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

An Algorithm or Another Strategy?

Standards Alignments

Addressing 3.NBT.A.2

Student-facing Task Statement

How would you find the value of $700 - 599$? Explain your reasoning.

Student Responses

Sample response: I would use a counting-up strategy because the numbers are both so close to hundreds that it would be a lot faster to count up than to use an algorithm.

Begin Lesson

Warm-up

10 min

Number Talk: Threes

Standards Alignments

Addressing 3.OA.B.5
Building Towards 3.OA.C.7

The purpose of this Number Talk is to elicit strategies students have for finding products of single-digit factors. These reasoning strategies help students develop fluency and will be helpful later in this unit when students solve two-step word problems.

When students use strategies based on the properties of multiplication to find unknown products, they look for and make use of structure (MP7). Students may reverse the order of the factors to create a multiplication fact they know. Students may think about "one more group" as they move from the first expression to the second expression (or the third to the fourth). Also, students may say that they "just know" the product. All of these responses are acceptable because students will be in different stages as they progress toward fluency.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- 2×6
- 3×6
- 2×7
- 3×7

Student Responses

- 12: I counted by 2. I just knew it.
- 18: I knew it would be one more group of 6 than the first one and 12 plus 6 is 18. I just knew it.
- 14: I knew it would be one more group of two than the first problem. It's 2 groups of 7, so I found $7 + 7$, which is 14.
- 21: It would be one more group of 7 than the last problem. 14 plus 7 is 21. It's 3 more than 3×6, or 3 more than 18, which is 21.

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

- "How did thinking about products of 2 help you find products of 3?" (I could think about 2 groups, then add one more group. I could think about 2 in each group, then one more in each group.)
- 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 problem in a different way?"
    - "Does anyone want to add on to _____'s

strategy?"

Activity 1

20 min

How Would You Subtract?

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to choose a strategy or algorithm to subtract within 1,000. Students should attend to the details of numbers in the problems that could indicate whether a particular strategy or algorithm is most useful. The important thing is that students choose an algorithm or another strategy that they can use efficiently and accurately for the given problem. As students choose strategies to find the values of each expression, they look for common structure and observe regularity in repeated reasoning (MP7, MP8).

Access for English Learners

MLR8 Discussion Supports. Display sentence frames to support partner discussion: "Can you say more about . . .?" and "Why did you . . .?"
Advances: Conversing, Representing

Access for Students with Disabilities

Engagement: Provide Access by Recruiting Interest. Revisit math community norms to prepare students for the activity in which they will be finding partners, sharing problem solving, and repeating with new partners.
Supports accessibility for: Social-Emotional Functioning

Student-facing Task Statement

Use a strategy or algorithm of your choice to find the value of each difference. Show your reasoning. Organize it so it can be followed by others.

1. $451 - 329$
2. $382 - 190$

Launch

- "We've been learning about subtraction algorithms. Remember that algorithms are just one way we can solve problems. We can also use other strategies or representations."
- "How would you describe the difference between an algorithm and other

3. $924 - 285$
4. $600 - 478$
5. $505 - 417$

Student Responses

1. 122. Sample response:

$$\begin{array}{rrcrcr} & & & 40 & & 11 \\ & 400 & + & \cancel{50} & + & \cancel{1} \\ - & 300 & + & 20 & + & 9 \\ \hline & 100 & + & 20 & + & 2 \end{array}$$

2. 192. Sample response: I subtracted 200 from 382 to get 182. Then I added 10 back.
3. 639. Sample response:

$$\begin{array}{rccc} & & & 11 \\ & 8 & \cancel{1} & 14 \\ & \cancel{9} & \cancel{2} & \cancel{4} \\ - & 2 & 8 & 5 \\ \hline & 6 & 3 & 9 \end{array}$$

4. 122. Sample response: I knew that 2 more would get me to 480. 20 more is 500. 100 more is 600. I had to count up 122 to get to 600.
5. 88. Sample response:

$$\begin{array}{rccc} & & & 9 \\ & 4 & \cancel{10} & 15 \\ & \cancel{5} & \cancel{0} & \cancel{5} \\ - & 4 & 1 & 7 \\ \hline & & 8 & 8 \end{array}$$

strategies?" (A strategy like adding up might work for the one problem you are solving, but an algorithm has steps that work for any problem.)

- 1 minute: partner discussion
- Share responses.
- "You're going to have an opportunity to find the value of each of these differences using a strategy or algorithm of your choice."

Activity

- "Work independently to find the value of each difference, then you'll have a chance to share your work."
- 7–10 minutes: independent work time
- Identify students who use the same strategy to subtract and those who use different ones.
- Choose a few problems for students to discuss. Consider selecting $382 - 190$ (the second expression) and $600 - 478$ (the fourth expression), which lend themselves to be evaluated with an algorithm and another strategy, respectively.
- "Find a partner who subtracted the same way you did. Discuss your reasoning."
- 1–2 minutes: partner discussion
- "Now find a partner who subtracted the problem in a different way from you. Discuss your reasoning."
- 2–3 minutes: partner discussion
- Repeat the discussion with 1-2 expressions or as many as time permits.

Synthesis

- Invite 4–5 students share a strategy or algorithm they saw.
- "What strategies or algorithms do you want to practice more?"

Activity 2

15 min

Greatest Difference, Smallest Difference

Standards Alignments

Addressing 3.NBT.A.2

The purpose of this activity is for students to play a game that enables them to practice using strategies and algorithms to subtract within 1,000. Students decide whether they will try to make the smallest or greatest difference, then spin a paper clip on a spinner to generate two three-digit numbers. Students use their choice of strategy or algorithm to subtract the numbers.

When students use place value to create a pair of numbers with a specific type of difference, they are looking for and making use of structure (MP7).

Materials to Gather

Paper clips, Pencils

Materials to Copy

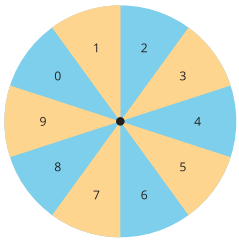
Greatest Difference, Smallest Difference (groups of 2)

Required Preparation

- Each group of 2 will need a paper clip.

Student-facing Task Statement

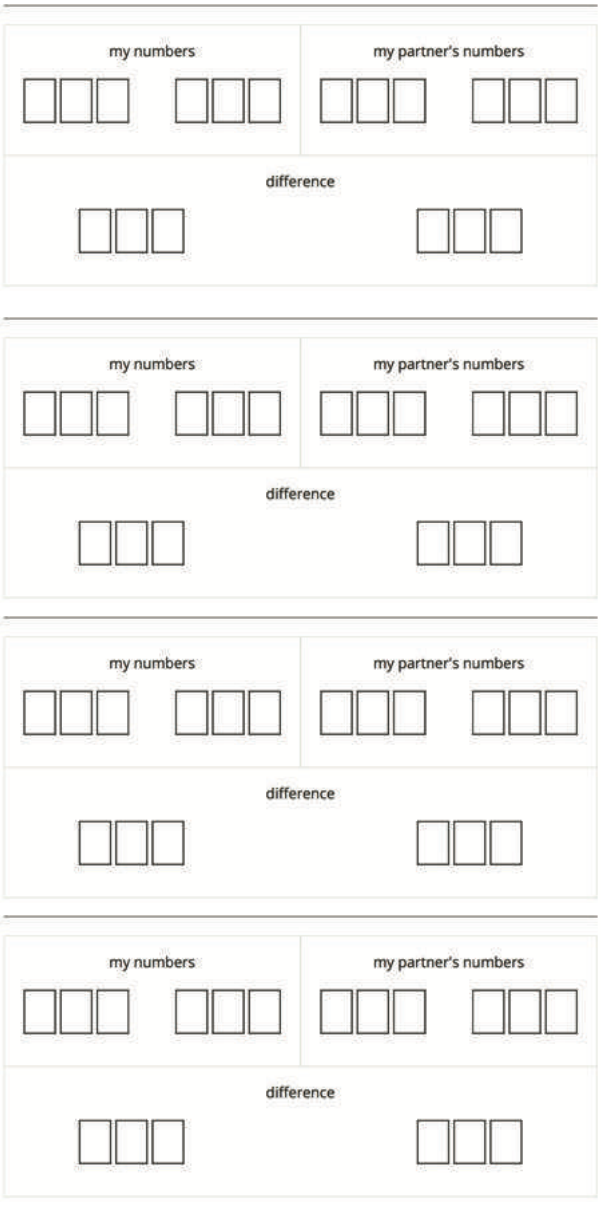
1. Decide with your partner whether you will try to make the greatest difference or smallest difference.
2. Take turns spinning and recording a digit in the hundreds, tens, or ones place. Continue until your numbers are complete.
3. Find the difference.



Launch

- Groups of 2
- Give each group 1 copy of Greatest Difference, Smallest Difference.
- "Take a minute and read the directions to the game with your partner."
- 1 minute: partner work time
- Play one round of the game against the class to illustrate how the game should be played.
- "Are there any questions about the game?"
- Answer any questions students have about the game.

4. Compare your values.
5. Write a comparison using >, <, or =.
6. Play again.



Student Responses

Answers vary.

Activity

- "Now, take some time and play the game with your partner."
- 7–10 minutes: partner work time

Synthesis

- Display: 601 and 398
- "If these were the numbers you made, how would you find the difference and why?" (Sample responses: I would count up because 398 is so close to 400. I would use an algorithm because I know that if I follow the steps it would work every time.)

Lesson Synthesis

10 min

"Today we used strategies to subtract. How did you decide when to use an algorithm or another strategy?" (If the numbers were hard to subtract mentally, I'd use an algorithm. If they were close to a hundred, or if I saw a certain relationship between them that made it easy to work out mentally, then I'd use another strategy.)

Suggested Centers

- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)

Student Section Summary

In this section, we learned algorithms to subtract numbers within 1,000. We also learned that we can choose whether to use an algorithm or another strategy for subtracting based on the numbers.

$$\begin{array}{rr} & \begin{array}{ccc} 400 & & 130 \end{array} \\ & \begin{array}{ccccccc} \cancel{500} & + & \cancel{30} & + & 8 \end{array} \\ - & \begin{array}{ccccccc} 100 & + & 50 & + & 6 \end{array} \\ \hline & \begin{array}{ccccccc} 300 & + & 80 & + & 2 \end{array} \end{array}$$

step 1

$$\begin{array}{r} 5\ 3\ 8 \\ -\ 1\ 5\ 6 \\ \hline 2 \end{array}$$

step 2

$$\begin{array}{r} {\scriptstyle 4\ 13} \\ \cancel{5}\ \cancel{3}\ 8 \\ -\ 1\ 5\ 6 \\ \hline 2 \end{array}$$

step 3

$$\begin{array}{r} {\scriptstyle 4\ 13} \\ \cancel{5}\ \cancel{3}\ 8 \\ -\ 1\ 5\ 6 \\ \hline 8\ 2 \end{array}$$

step 4

$$\begin{array}{r} {\scriptstyle 4\ 13} \\ \cancel{5}\ \cancel{3}\ 8 \\ -\ 1\ 5\ 6 \\ \hline 3\ 8\ 2 \end{array}$$

Complete Cool-Down

Response to Student Thinking

Students do not explain how they would subtract.

Next Day Support

- Before the warm-up, have students recap the important points of previous lessons.

Section C: Round Within 1,000

Lesson 13: Multiples of 100

Standards Alignments

Addressing	3.NBT.A.1
Building Towards	3.NBT.A.1

Teacher-facing Learning Goals

- Recognize that numbers are often approximated by their closest multiples of 10 or 100.
- Understand the meaning of the nearest multiple of 100.

Student-facing Learning Goals

- Let's explore multiples of 100 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 immediate multiples of 100, using number lines to do so.

In grade 2, students learned to represent whole numbers within 1,000 and make sense of their relative sizes on a number line. They also used number lines to represent addition and subtraction, and they often and intuitively relied on multiples of 10 and 100 as benchmarks to reason about sums and differences. (For example, to find $105 - 17$, they may start at 105, move 5 to the left to 100, move 10 more to the left to 90 and then move 2 more to land at 88.)

In this lesson, students take a closer look at the relationship between numbers within 1,000 and multiples of 100. The lesson begins by eliciting students' informal ideas about what it means for numbers to be "close to" multiples of 100. Then, they use number lines to identify the multiples of 100 between which a two- or three-digit number lies and examine their relative distance from the number.

The work with number lines here allows students to reason visually about proximity to multiples of 100, preparing them to reason numerically about nearest multiples of 100 and about the idea of rounding in upcoming lessons.

Access for:

Students with Disabilities

- Action and Expression (Activity 1)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Estimation Exploration (Warm-up)

Lesson Timeline

Warm-up	10 min
Activity 1	10 min
Activity 2	25 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

In grade 2, students were introduced to the number line. What previous understandings are students leveraging as they use the number line to find the nearest multiple of 100?

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

5 min

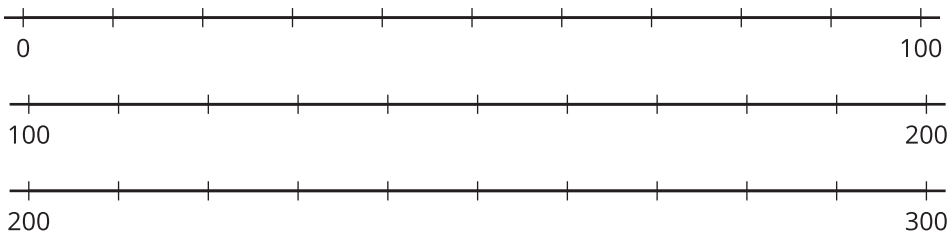
Locate, Label, and Name

Standards Alignments

Addressing 3.NBT.A.1

Student-facing Task Statement

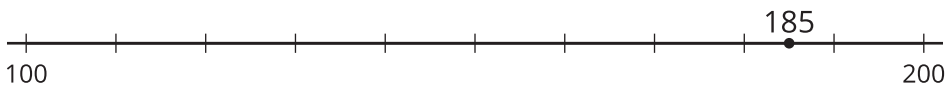
1. Locate and label 185 on the number line on which it belongs.



2. Name the closest multiple of 100 to 185.

Student Responses

1.



2. 200

Begin Lesson

Warm-up

10 min

Estimation Exploration: Marching Band

Standards Alignments

Building Towards 3.NBT.A.1

The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information. It gives students a low-stakes opportunity to share a mathematical claim and the thinking behind it (MP3). Asking yourself "Does this make sense?" is a component of making sense of problems (MP1), and making an estimate or a range of reasonable answers with incomplete information is a part of modeling with mathematics (MP4).

Instructional Routines

Estimation Exploration

Student-facing Task Statement

How many people are in the marching band?

Launch

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

Record an estimate that is:

too low	about right	too high

Student Responses

Sample responses:

- Too low: < 140
- About right: 140–200
- Too high: > 200

Activity

- "Discuss your thinking with your partner."
- 1 minute: partner discussion
- Record responses.
- "Which groups on the field did you count as part of the marching band?" (I counted only the performers in the band uniforms. I included everyone on the field.)

Synthesis

- "Notice that many of our estimates are expressed in terms of tens and hundreds. Why might that be? Why don't we estimate that there are about, say, 163 people or 248 people in the picture?" (If we are estimating, we aren't trying to guess the exact number. Tens and hundreds are easy to think about.)
- "It is often helpful to get a sense of a quantity (how many, how much, how long, etc.) with groups of 10 or groups of 100. Numbers like 50 and 90 that are groups of 10 can be called 'multiples of 10.' Numbers like 200 or 700 that are groups of 100 can be called 'multiples of 100.'"
- "When we estimate, we often name the multiple of 10 or 100 that we think the number is close to."
- "But how do we decide whether a number is close to some multiple of 10 or 100? We'll think more about this question in the next activity."

Activity 1

10 min

About 100? Close to 100?

Standards Alignments

Addressing 3.NBT.A.1

The purpose of this activity is for students to think about what it means for numbers to be close to multiples of 100. There is no definition given about what "close to" means during the activity, so students may interpret the term in different ways.

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

Student-facing Task Statement

1. Here are the numbers of people in different parts of a school at noon during a school day.
    - playground: 94
    - cafeteria: 163
    - art room: 36
    - library: 13
    - classrooms: 216
    - gymnasium: 109
    - music room: 52

    Where in the school would you say that there are about 100 people?

    Record the numbers in the table. Be prepared to explain your reasoning.

about 100	not about 100

2. Now decide if the number of people in each part of the school is close to 0, close to 100, or close to 200.

    If you don't think a number belongs in any column, set it aside. Be prepared to explain your reasoning.

Launch

- Groups of 2
- Display the first problem.
- "Take a minute to look at the numbers of people in different parts of a school during a school day. What do you notice? What do you wonder?" (There aren't many people in the library. There are a lot of people in the school. Are there any other places where people could be in the school?)
- 1 minute: quiet think time
- Share and record responses.

Activity

- "For each room, decide if there are about 100 people in the room or not. Record the numbers in the table. Be prepared to explain how you decide a number is or is not about 100."
- 2 minutes: independent work time
- Share responses.
- "Now, work with your partner to decide if the number of people in each part of the school is close to 0, close to 100, or close to 200. If you don't think a number belongs in any column, set it aside. Be prepared to explain your reasoning."
- 2–3 minutes: partner work time

close to 0	close to 100	close to 200

Student Responses

1. Sample response:

about 100	not about 100
94, 109	163, 36, 13, 216, 52

2. Sample response:

close to 0	close to 100	close to 200
13	94, 109	216

Numbers that don't belong in any column: 36, 52, 163

- Monitor for students who provide reasoning for where they would place 36, 52, and 163. Ask them to share during the synthesis.

Synthesis

- "How did you decide whether a number is close to 0, 100, or 200?" (I thought about whether it was almost that number, like 94 is almost 100. I decided between the choices that were there—like for 216, it was closer to 200 than to 0 or 100.)
- "How did you decide if a number doesn't belong to any of these groups?" (If a number seemed far away from all the choices, then I set it aside. Like 52 wasn't close to 0 or 100 because it's almost right in the middle.)
- "What if the table showed 'closer to 0,' 'closer to 100,' and 'closer to 200?' Would it change where each number goes? Would you be able to place all the numbers in the table?" (Yes, because I would just be choosing the number that's closer than the other numbers, not saying it's really close to the number.)

Activity 2

25 min

Close to Multiples of 100

PLC Activity

Standards Alignments

Addressing 3.NBT.A.1

The purpose of this activity is for students to locate two- and three-digit numbers on a series of number lines. The endpoints of each number line are multiples of 100, 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. Later in the activity, students use a number line to name the closest multiple of 100 to a given number. When students choose the correct number line and accurately place each number on the number line they attend to precision and show an understanding of place value (MP6, MP7).

Access for English Learners

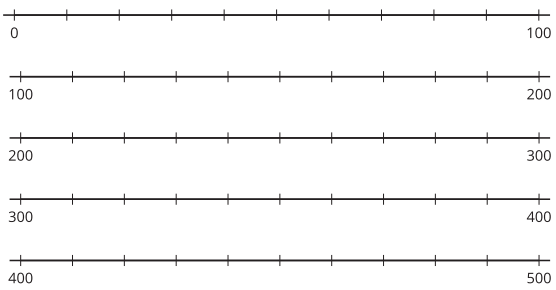
MLR8 Discussion Supports: Create a visual display of the number lines. As students share their strategies, annotate the display to illustrate connections. For example, as students talk about their numbers and number lines, write the number below the appropriate tick mark, and draw arrows to show the closest multiple of 100 they identified.
Advances: Speaking, Representing

Student-facing Task Statement

Your teacher will assign a set of numbers to you.

A	94	36	109	163	229
B	24	52	216	11	481
C	187	135	67	83	241
D	332	154	408	296	45
E	279	205	377	449	73

1. Work with your group to decide on which number line each number should go. Then, locate and label each number on the number line.

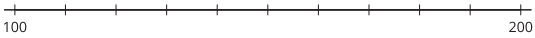


2. Locate and label 364 on the correct number line.

    a. Name two multiples of 100 that are closest to 364.

Launch

- Groups of 4
- "What do you know about the number line?" (Each point on the number line can represent a number. You can add or subtract by moving right or left on the number line. It can show distance between numbers, like the number 10 is 10 away from 0.)
- 1 minute: quiet think time
- Share and record responses.
- "Take a look at the number lines in the first problem. What do you notice about them? What do you wonder?" (Students may notice: Each number line has two multiples of 100. There are tick marks between the numbers. Students may wonder: Why don't the number lines go higher or lower? What numbers do the tick marks represent?)
- 30 seconds: quiet think time
- Share responses.
- Display the number line:



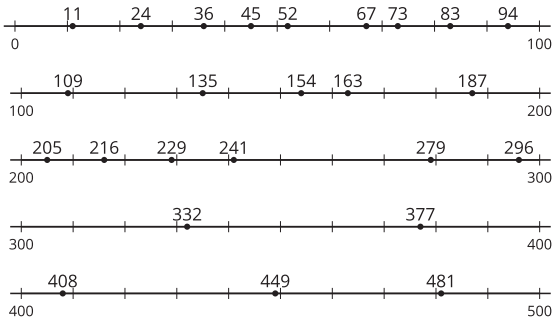
- "Do you see multiples of 100 in this

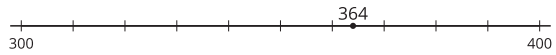
b. Of the two multiples of 100 you named, which one is 364 closer to?

3. Write the numbers assigned to you earlier. For each number, name the nearest multiple of 100.

number					
nearest multiple of 100					

Student Responses

1. 

2. 

   a. 300 and 400

   b. 400

3. The numbers in parentheses are the nearest multiples of 100.

A	94 (100)	36 (0)	109 (100)	163 (200)	229 (200)
B	24 (0)	52 (100)	216 (200)	11 (0)	481 (500)
C	187 (200)	135 (100)	67 (100)	83 (100)	241 (200)
D	332 (300)	154 (200)	408 (400)	296 (300)	45 (0)
E	279 (300)	205 (200)	377 (400)	449 (400)	73 (100)

number line?" (Yes, 100 and 200)

- "What numbers do you think the unlabeled tick marks represent?" (Tens, groups of 10, numbers that we get if we count up by 10 starting from 100, multiples of 10) "Let's name them!" (100, 110, . . . , 200)
- Label the first few tick marks.
- "Can you estimate where 113 goes on the number line?" (Between the second and third tick marks, but closer to the second tick mark. Or between 110 and 120, but closer to 110.)
- Assign one set of numbers (A, B, C, D, or E) to each group of 4.

Activity

- "Work with your group to decide on which number line each number should go. Locate each number on the number line with a dot, and label it. Then, complete the second problem."
- 5–7 minutes: small group work time
- After students place 364 on a number line, pause for a discussion. Ask each group to share one of their numbers and how they knew on which number line to place it.
- "On which number line did you place 364?" (The number line with 300 and 400.)
- "How did you decide which multiple of 100 was the closest?" (Once I located 364 on my number line I could tell it was closer to 400. I counted the tick marks back to 300 and up to 400 and it was less tick marks to get to 400, so it was closer.)
- "Complete the last problem on your own."
- 2–3 minutes: independent work time

Synthesis

- "How can you tell which multiple of 100 a number is closest to?" (The endpoints of

the number lines are multiples of 100. From the number line, we can tell whether a point is closer to one end or the other. We can tell if a point is in the lower half or upper half of the number line. We can count the tick marks to each multiple of 100 to decide which one is closer.)

Advancing Student Thinking

If students place a number on a number line on which it doesn't belong, such as placing 216 on the number line that goes from 100 to 200, consider asking:

- "Tell me how you decided to place 216 on that number line?"
- "Can you show me where 216 would be on that number line?"

Lesson Synthesis

10 min

"Today we located and labeled numbers on number lines, and decided which multiple of 100 a given number would be closest to."

"Look back at the table from the last activity. What do you notice about the nearest multiples of 100 for your set of numbers?" (Sometimes the nearest multiple is greater than the numbers, sometimes it is less. Sometimes the nearest multiple of 100 is 0. Some multiples of 100 are really far away from the original number. For example, 449 is 49 away from 400. Two numbers that are very different or seem far apart could have the same nearest multiple of 100. For example, 67 and 135 both have 100 as their nearest multiple of 100.)

Suggested Centers

- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Addressing)
- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)

Complete Cool-Down

Response to Student Thinking

Students place 185 on the correct number line, but don't place it in the correct location.

Next Day Support

- During the launch of the next day's activity, have students discuss where they would place 185 on the second number line.

The work in this lesson builds from number line concepts developed in a prior unit.

Prior Unit Support

Grade 2, Unit 4, Section A: The Structure of the Number Line

Lesson 14: Nearest Multiples of 10 and 100

Standards Alignments

Building On	2.NBT.B.8
Addressing	3.NBT.A.1
Building Towards	3.NBT.A.1

Teacher-facing Learning Goals

- Identify the closest multiples of 10 and 100 for numbers within 1,000.
- Understand that rounding is a formal way to say which number a given number is closer to, and that number is often a multiple of 10 or 100.
- Understand the meaning of "the closest multiple of 10."

Student-facing Learning Goals

- For a given number, let's find the closest multiple of 100 and the closest multiple of 10.

Lesson Purpose

The purpose of this lesson is for students to reason about the position of numbers relative to their immediate multiples of 10 and 100, using number lines to do so.

In a previous lesson, students reasoned about the nearest multiple of 100 to a given number. In this lesson, students extend this work to include multiples of 10. The work here prepares students to round numbers to the nearest ten and hundred in upcoming lessons.

Number lines are still a central representation early in the lesson. Later in the lesson, students begin to reason numerically and think about how they could find the nearest multiple of 10 or 100 if a number line is not provided. Students should be encouraged to consider alternative strategies and use what they know about place value, but can still draw a number line if it is needed. In the lesson synthesis, students learn that **rounding** is a formal way to say which number a given number is closer too, and that number is often a multiple of 10 or 100.

Access for:

Students with Disabilities

- Engagement (Activity 1)

English Learners

- MLR2 (Activity 2)

Instructional Routines

Estimation Exploration (Warm-up)

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

In this lesson students are encouraged to begin reasoning numerically about finding the nearest multiple of 10 or 100. What evidence did you see of such reasoning?

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

5 min

Closest Multiple of 10 and 100

Standards Alignments

Addressing 3.NBT.A.1

Student-facing Task Statement

1. What is the nearest multiple of 100 to 162? Is it 100 or 200? Explain or show your reasoning.
2. What is the nearest multiple of 10 to 162? Is it 160 or 170? Explain or show your reasoning.

Student Responses

1. 200. Sample response: 150 is right in between and 162 is greater, so it's closer to 200 than to 100.
2. 160. Sample response: From 162, it's 8 counts up to get to 170, but only 2 counts back to 160, so 160 is closer than 170.

Begin Lesson

Warm-up

10 min

Estimation Exploration: What Number Could this Be?

Standards Alignments

Building On	2.NBT.B.8
Building Towards	3.NBT.A.1

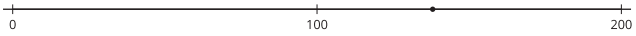
The purpose of this Estimation Exploration is for students to think about what value a point on the number line could represent. The only labeled tick marks are hundreds so students need to reason about what numbers are in between and how far the point is from the labeled numbers.

Instructional Routines

Estimation Exploration

Student-facing Task Statement

What number could the point on the number line represent?



Record an estimate that is:

too low	about right	too high

Student Responses

Sample responses:

- Too low: < 130
- About right: 130–140
- Too high: > 140

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

- Consider asking:
  - "Is anyone's estimate less than _____? Is anyone's estimate greater than _____?"
  - "Based on this discussion does anyone want to revise their estimate?"
- "What would help us be more sure of our estimate?" (More tick marks that are equally spaced. Marks of multiples of 10.)

Activity 1

20 min

Close to Multiples of 10

Standards Alignments

Addressing 3.NBT.A.1

Previously, students identified two multiples of 100 that border a given number, reasoned about their relative distance from the number, and then named the nearest multiple of 100. The purpose of this activity is for students to practice naming the nearest multiple of 100 and apply the same reasoning to identify the nearest multiple of 10. They determine two multiples of 10 that are closest to a given number (two intermediate tick marks on the number line) and then identify the multiple of 10 that is closer.

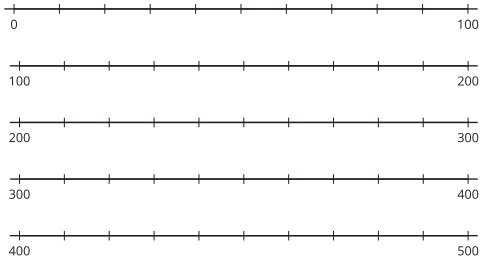
Access for Students with Disabilities

Engagement: Provide Access by Recruiting Interest. Leverage choice around perceived challenge. Invite students to select at least 3 of the 5 problems to complete.
Supports accessibility for: Organization, Attention, Social-emotional skills

Student-facing Task Statement

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

128 272 436 89 351



   b. The same numbers are listed in the table. Name the multiple of 100 that is the nearest to each number. (Leave the last column blank for now.)

Launch

- Groups of 2
- "Locate and label each number in the table on the number line. Then, find the nearest multiple of 100. Leave the last column blank for now."
- 3–5 minutes: partner work time
- Share responses.

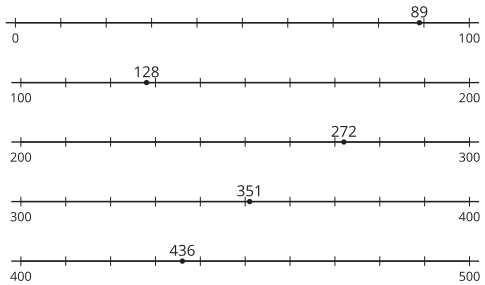
Activity

- "Now, complete the second problem with your partner. Be prepared to share your reasoning."
- 1–2 minutes: partner work time
- "How did you decide which multiples of 10 were closest to 128?" (Sample responses: I

number	nearest multiple of 100	
128		
272		
436		
89		
351		

2. Look at the point for 128 on the number line.
   a. Name two multiples of 10 that are the closest to 128.
   b. Which of the two is the nearest multiple of 10?
3. Label the last column in the table "nearest multiple of 10." Then, name the nearest multiple of 10 for each number. Use the number lines if you find them helpful.

Student Responses

1.
   a. 

   b. See completed table.
2. a. 120 and 130
   b. 130
3. Completed table:

number	nearest multiple of 100	nearest multiple of 10
128	100	130
272	300	270
436	400	440

looked at which multiples of 10 it was in between. I looked for a multiple of ten to the right and a multiple of 10 to the left, these were the closest.)

- Have students label the last column and record the multiple of 10 that was closest to 128.
- "Complete the last problem independently."
- 3–5 minutes: independent work time

Synthesis

- "How do you know which multiple of 10 is the nearest for each number?" (If we label and locate the number on the number line, we can see which tick mark the point is closer to. We can see how many numbers to count up or down to get to a multiple of 10. For example, we only count up once to get from 89 to 90, but we count down 9 times to get down to 80.)

number	nearest multiple of 100	nearest multiple of 10
89	100	90
351	400	350

Activity 2

15 min

The Nearest Multiples

Standards Alignments

Addressing 3.NBT.A.1

In this activity, students identify the nearest multiples of 10 and 100 for given three-digit numbers. 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 and decide not to use number lines. The work here prepares students to reason numerically in the next lesson.

When students notice and describe patterns in the relationship between the numbers and the nearest multiples of 10 or 100, they look for and express regularity in repeated reasoning (MP8).

Access for English Learners

MLR2 Collect and Display: Circulate, listen for, and collect the language students use as they make sense of "close to" and "about." On a visible display, record words and phrases such as: "almost 100, but not exactly," "only 1 away from 100," "less than 5 away." Invite students to borrow language from the display as needed, and update it throughout the lesson.
Advances: Conversing, Reading

Student-facing Task Statement

1. a. Is 349 closer to 300 or 400?
   b. Is 349 closer to 340 or 350?
2. a. Is 712 closer to 700 or 800?
   b. Is 712 closer to 710 or 720?

Launch

- Groups of 2
- "Let's find more multiples of 10 and 100 that are close to some numbers."
- "Notice that no number lines are given. See

3. a. Is 568 closer to 500 or 600?
   b. Is 568 closer to 560 or 570?
4. Without locating a given number on a number line, how did you decide:
   a. the nearest multiple of 100?
   b. the nearest multiple of 10?
5. Name the nearest multiple of 100 and the nearest multiple of 10 for:
   a. 324
   b. 89

Student Responses

1. a. 300
   b. 350
2. a. 700
   b. 710
3. a. 600
   b. 570
4. a. Sample responses: I looked at whether the number is more than halfway between the lower and the higher multiple of 100. I looked at whether the two digits are more or less than 50. I looked at whether the digit in the tens place was more or less than 5.
   b. Sample responses: I looked at whether the number is more than halfway between the lower and the higher multiple of 10. I looked at whether the last digit (in the ones place) is more or less than 5.
5. a. 300 and 320
   b. 100 and 90

if you can still find the nearest multiples of 10 and 100 without them. If you need to, you can still use a number line."

Activity

- "Work with your partner to complete these problems."
- 5–7 minutes: partner work time
- Monitor for students who use the following strategies to highlight:
  - Reason about the midpoint between a multiple of 10 or a multiple of 100 (5 or 50) to determine which multiple is closer, such as, "568 is closer to 570 because 565 would be the middle point between 560 and 570."
  - Use place value patterns to determine which multiple is closer, such as, "Since the 1 in 712 is less than 5, it tells me that the number is closest to 700."
- Pause for a brief discussion before students complete the last problem.
- Select previously identified students share the strategies they used to find the nearest multiple of 100 and the nearest multiple of 10.
- "Now take a few minutes to complete the last problem."
- 2–3 minutes: independent work time

Synthesis

- Invite students to share their responses and reasoning for the last problem.

Advancing Student Thinking

If students don't identify the closest multiple of 10 or 100, consider asking:

- "What have you tried to find the closest multiple of 10 (or 100)?"
- "How could you use a number line to find the closest multiple of 10 (or 100)?"

Lesson Synthesis

10 min

"Today we found the nearest multiple of 100 and the nearest multiple of 10 to a given number. When we name another number that is close to a given number, we are **rounding** the given number. For example, we can round 568 to 570 or to 600. Often, the numbers we use for rounding are multiples of 10 or 100."

"If we want to use *round* to say 'find the nearest multiple of 10,' we can say 'round to the nearest ten.' We can use *round* with hundreds too. Instead of saying 'find the nearest multiple of 100,' we can say, 'round to the nearest hundred.'"

Suggested Centers

- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Addressing)
- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)
- Capture Squares (1–3), Stage 6: Multiply with 1–5 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students select 100 or 170 as the closest multiple of 100 or 10 to 162.

Next Day Support

- During the launch on the next day's activity, display 162 on a number line marked with multiples of 10 and 100 and have students discuss the nearest multiple of 10 and 100.

Lesson 15: Round to the Nearest Ten and Hundred

Standards Alignments

Building On	2.NBT.B.8
Addressing	3.NBT.A.1
Building Towards	3.NBT.A.1

Teacher-facing Learning Goals

- Round whole numbers within 1,000 to the nearest ten and hundred, using the convention of rounding up when the number is halfway between two multiples of 10 or 100.

Student-facing Learning Goals

- Let's round to the nearest ten and hundred.

Lesson Purpose

The purpose of this lesson is for students to round whole numbers within 1,000 to the nearest ten or hundred.

Before this lesson, students named multiples of 10 and 100 that are near given numbers and identified the multiple of 10 or 100 that was closest. They located numbers on a number line and approximated their distance from adjacent tick marks that indicate tens, or from endpoints that mark hundreds.

Here, students learn that sometimes, when we round to the nearest ten and the nearest hundred, we round to the same number. Students also learn that when numbers are right in the middle of two multiples of 10 or 100, the convention is to round up. Students use rounding to estimate the number of students in a school and see that rounding to the nearest ten and the nearest hundred can give different estimates for the same situation.

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR1 (Activity 1)

Instructional Routines

Choral Count (Warm-up)

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 is your students' understanding of place value contributing to their work rounding to the nearest ten and hundred?

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

5 min

Round It Twice

Standards Alignments

Addressing 3.NBT.A.1

Student-facing Task Statement

1. Round 237 to the nearest ten. Show or explain your reasoning.
2. Round 237 to the nearest hundred. Show or explain your reasoning.

Student Responses

1. 240. Sample response: 237 is between 230 and 240. It is closer to 240, since it's only 3 away.
2. 200. Sample response: 237 is between 200 and 300. It is closer to 200, since it's under 250.

Begin Lesson

Warm-up

10 min

Choral Count: Tens and Hundreds

Standards Alignments

Building On 2.NBT.B.8

Building Towards 3.NBT.A.1

The purpose of this Choral Count is for students to practice counting by 10 and 100 and notice patterns in the count. These understandings help students develop fluency and will help students see that multiples of 100 are also multiples of 10, and prepare them to round large numbers to the nearest ten and hundred.

Instructional Routines

Choral Count

Student Responses

- Record the first count vertically with 10–100 in one column and 110–200 in the second column.
- Record the second count vertically in one column from 100–900.

Sample responses:

- The tens place goes up by one as you move down a row in the first count.
- The hundreds place goes up by one as you move down a row in the second count.
- There are no ones in any of the numbers in the first count.
- The first count is all multiples or groups of 10.
- There are no tens or ones in any of the numbers on the second count.
- The second count is all multiples or groups of 100.

Launch

- "Count by 10, starting at 0."
- Record as students count.
- Stop counting and recording at 200.
- "Count by 100, starting at 0."
- Record as students count.
- Stop counting and recording at 900.

Activity

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

Synthesis

- "Why do 100 and 200 show up in both of these counts?" (You say 100 and 200 when you are counting by tens or hundreds. You can think of 100 as 10 tens or 200 as 20 tens. 100 and 200 are multiples of 10 and multiples of 100.)

Activity 1

20 min

Can the Nearest Ten and Hundred be the Same?

Standards Alignments

Addressing 3.NBT.A.1

The purpose of this activity is for students to round given numbers to the nearest ten and hundred and see that the result can be the same for some numbers. Students think about what it means to round a number that is exactly halfway between two tens or two hundreds and are introduced in the synthesis to the convention that these numbers are rounded up (MP3).

Access for English Learners

MLR1 Stronger and Clearer Each Time: Before the whole-class discussion, give students time to meet with 2–3 partners to share and get feedback on their response to "What does 97 round to when we are rounding to the nearest 10? To the nearest hundred? Why does that happen?" Invite listeners to ask questions, to press for details and to suggest mathematical language. Give students 2–3 minutes to revise their written explanation based on the feedback they receive.
Advances: Writing, Speaking, Listening

Access for Students with Disabilities

Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were most useful to solve the problems. Display the sentence frame, "The next time I round numbers to the nearest ten and nearest hundred, I will pay attention to . . . ."
Supports accessibility for: Conceptual Processing

Student-facing Task Statement

1. Round each number to the nearest ten and the nearest hundred. Use number lines if you find them helpful.

number	nearest ten	nearest hundred
18		
97		
312		
439		
601		

2. Kiran and Priya are rounding some numbers and are stuck when trying to round 415 and 750.

Launch

- Groups of 2
- "Let's round some numbers to the nearest ten and the nearest hundred. Remember 'round to the nearest ten (or hundred)' is another way of saying find the nearest multiple of 10 (or 100)."

Activity

- "Work with your partner to complete the table."
- 3–5 minutes: partner work time
- Monitor for students who notice 97 and 601 round to the same number whether

- Kiran said, “415 doesn’t have a nearest multiple of 10, so it can’t be rounded to the nearest ten.”
- Priya said, “750 doesn’t have a nearest multiple of 100, so it can’t be rounded to the nearest hundred.”

Do you agree with Kiran and Priya? Explain your reasoning.

Student Responses

1. Completed table:

number	nearest ten	nearest hundred
18	20	0
97	100	100
312	310	300
439	440	400
601	600	600

2. Sample responses:
   - I agree that 415 has no nearest multiple of 10 and 750 has no nearest multiple of 100. I think they’re right that these numbers can’t be rounded.
   - I agree with Kiran that 415 doesn’t have one nearest multiple of 10. It has two. I agree with Priya that 750 doesn’t have one nearest multiple of 100. It has two. I disagree that the numbers can’t be rounded. Maybe we can just choose one of those two multiples.

rounding to the nearest ten or the nearest hundred.

- Select previously identified students to share their responses.
- “Why did 97 and 601 round to the same number when we rounded to the nearest ten and the nearest hundred?” (The closest multiple of 10 was also a multiple of 100. 100 and 600 are multiples of 100, but they are also multiples of 10.)
- “Complete the second problem with your partner. Explain your reasoning.”
- 3–5 minutes: partner work time
- Monitor for the following in student explanations to share in the synthesis:
  - 415 is halfway between 410 and 420.
  - 415 is the same distance from 410 and 420.
  - 415 has two closest multiples of 10: 410 and 420.
  - 750 is halfway between 700 and 800.
  - 750 is the same distance from 700 and 800.
  - 750 has two closest multiples of 100: 700 and 800.

Synthesis

- Select previously identified students to share their responses.
- “Kiran and Priya are correct. There isn’t one closest multiple of 10 to 415 because it’s right in the middle of two multiples of 10. There isn’t a closest multiple of 100 to 750 because it’s right in the middle of two multiples of 100.”
- “In cases like this, we round up. For example, since 415 is halfway between 410 and 420, we would round up to 420 to

round 415 to the nearest ten."

- "Since 750 is halfway between 700 and 800, we would round up to 800."
- "In both of these situations we could go the other way, but it is helpful if we all do the same thing in these situations."

Activity 2

15 min

Round to Estimate

Standards Alignments

Addressing 3.NBT.A.1

The purpose of this activity is for students to practice rounding to the nearest ten and hundred in context. Students work with numbers from a previous lesson to estimate the total number of students in a school. They learn that how you round (to the nearest ten or hundred) can give different estimates for the same situation.

Student-facing Task Statement

The table shows the numbers of people in different parts of a school at noon during a school day.

Andre and Lin are trying to estimate the number of people in the whole school. Andre plans to round the numbers to the nearest hundred. Lin plans to round them to the nearest ten.

1. Make a prediction: Whose estimate is going to be greater? Explain your reasoning.
2. Work with a partner to find Andre and Lin's estimates. Record them in the table. Then find the totals.

Launch

- Groups of 2
- "Let's revisit the number of students in different areas in a school. We're going to use rounding to help Andre and Lin make an estimate of the number of people in the whole school. Andre plans to round the numbers to the nearest hundred. Lin plans to round them to the nearest ten."
- "Make a prediction: Whose estimate is going to be greater? Be prepared to explain your reasoning."
- 30 seconds: quiet think time
- Share responses.

location	number	Andre's estimate (nearest hundred)	Lin's estimate (nearest ten)
playground	94		
cafeteria	163		
art room	36		
library	13		
classrooms	216		
gymnasium	109		
music room	52		
total			

3. Make two observations about the completed table. Was your prediction correct?

Student Responses

1. Sample responses:
    - I predict Andre's total will be greater because his numbers will all be in the hundreds, even if the numbers are less than 100.
    - I predict Lin's total will be greater because some of Andre's numbers will be 0.
2. Completed table:

location	number	Andre's estimate (nearest hundred)	Lin's estimate (nearest ten)
playground	94	100	90
cafeteria	163	200	160
art room	36	0	40
library	13	0	10
classrooms	216	200	220
gymnasium	109	100	110
music room	52	100	50
total		700	680

Activity

- "Work with your partner to complete the table and the last problem."
- 7–10 minutes: partner work time

Synthesis

- Invite students to share their observations about the completed table, including whether it matched their predictions.
- "When we are estimating a total, rounding to the nearest ten or the nearest hundred can give us different results. If you were rounding to estimate a total, would you round to the nearest ten or nearest hundred?" (The nearest ten because you get an estimate that's closer to the total. The nearest hundred because multiples of 100 are easier to work with.)
- "Keep these ideas in mind as you use rounding to estimate in future lessons."

3. Sample responses:
    - Andre's estimate is 20 more than Lin's. My prediction was wrong.
    - Sometimes there's no difference in their estimates, but other times they are different by 10, 20, or 50.
    - For two numbers, Andre's estimate made it look like there were 0 people in those places (art room and library), while there were actually 36 and 13.

Lesson Synthesis

10 min

"Today we rounded numbers to the nearest ten and the nearest hundred."

"What important ideas about rounding did we learn today?" (Rounding to the nearest ten and the nearest hundred sometimes gives the same number. When a number is right in between two multiples of 10 or 100, we round up. We can round to estimate. How we round can change our estimate.)

Suggested Centers

- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Addressing)
- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)
- Capture Squares (1–3), Stage 6: Multiply with 1–5 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students round 237 to 230 or 300 when rounding to the nearest ten and hundred.

Next Day Support

- During the launch on the next day's activity, display 237 on a number line marked with multiples of 10 and 100 and have students discuss the nearest multiple of 10 and 100.

Lesson 16: Round and Round Again

Standards Alignments

Addressing 3.NBT.A.1, 3.OA.C.7

Teacher-facing Learning Goals

- Recognize and generalize patterns in the rounding of whole numbers within 1,000.

Student-facing Learning Goals

Let's look for patterns in rounding.

Lesson Purpose

The purpose of this lesson is for students to use their understanding of rounding to consider all the numbers that round to a given number.

Students deepen their understanding of rounding to go beyond accurately rounding individual numbers as they think about what numbers round to a given number. Working backward from a multiple of 10 or 100 allows students to think about the relative distance of numbers and the range of numbers that round to the given multiple of 10 or 100. Students then use this understanding to write clues to help their classmates guess a mystery number. What a number rounds to becomes a useful way to describe a number in this game.

This lesson has a Student Section Summary.

Access for:

Students with Disabilities

- Action and Expression (Activity 2)

English Learners

- MLR8 (Activity 1)

Instructional Routines

Number Talk (Warm-up)

Materials to Gather

- Index cards: Activity 2

Lesson Timeline

Warm-up	10 min

Teacher Reflection Question

What was the best question you asked students today? Why would you consider it the best one

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

based on what students said or did?

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

5 min

What is Clare's Mystery Number?

Standards Alignments

Addressing 3.NBT.A.1

Student-facing Task Statement

Clare says she's thinking of a mystery number and gives these three clues:

- The number is even.
- The number rounded to the nearest ten is 270.
- The number is between 260 and 280.

What are 2 numbers that could be Clare's mystery number?

Student Responses

Any 2 of 266, 268, 270, 272, or 274.

Begin Lesson

Warm-up

10 min

Number Talk: More Groups, Fewer Groups

Standards Alignments

Addressing 3.OA.C.7

The purpose of this Number Talk is to elicit strategies and understandings students have for products of 4 and 6 as they relate to products of 5. These understandings help students develop fluency and will be helpful later when students consider solutions for and solve two-step word problems.

When students use products of 5 to determine products of 4 by thinking of them as one fewer group or one fewer object in each group, or work from products of 5 to determine products of 6 by thinking of them as one more group or one more object in each group, they look for and make use of structure (MP7).

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- 5×7
- 4×7
- 6×7
- 4×8

Student Responses

- 35: because I counted by 5 like 5, 10, 15, 20, 25, 30, 35. I just knew it.
- 28: because there would be 4 groups of 7 instead of 5. So, 35 minus 7 would be 28.
- 42: because there would be one more group of 7 than in the first problem. So, 35 plus 7 would be 42.
- 32: because there would be one less group of 8 than 5×8. So 40 minus 8 would be 32.

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

- "How does knowing 5×7 help you find some of the other products?" (I can remove a group of 7 to find 4×7 or add a group of 7 to find 6×7.)
- 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 problem in a different way?"
    - "Does anyone want to add on to _____'s strategy?"

Activity 1

15 min

All the Numbers

Standards Alignments

Addressing 3.NBT.A.1

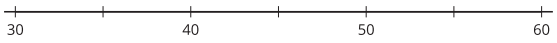
The purpose of this activity is for students to apply what they learned about rounding in prior lessons to think about all the numbers that would round to a given number. Students should be encouraged to use whatever representations make sense to them. Although the number line is often used to represent rounding, it is also worth sharing other ways that students are representing or thinking about rounding.

Access for English Learners

MLR8 Discussion Supports. Synthesis: Some students may benefit from the opportunity to rehearse what they will say with a partner before they share with the whole class.
Advances: Speaking

Student-facing Task Statement

1. What are all the numbers that would round to 50 if you're rounding to the nearest ten? You can use this number line if it helps you.



2. What are all the numbers that would round to 70 if you're rounding to the nearest ten?
3. What are all the numbers that would round to 600 if you're rounding to the nearest hundred?

If you finish early, find the numbers that would round to 100 and to 500 if you're rounding to the nearest hundred. Compare your lists with a partner's lists and discuss patterns you see.

Launch

- Groups of 2
- "Diego is thinking of a number. When you round Diego's number to the nearest ten, the answer is 40. What's a number that could be Diego's number? What's a number that could not be Diego's number?" (38 rounds to 40 so it could be his number. 34 does not round to 40 so it couldn't be his number.)
- 30 seconds: quiet think time
- Share 3–5 responses. Highlight the idea that more than one number can round to 40 and that some numbers are greater than 40 and some are less than 40.

Student Responses

1. 45, 46, 47, 48, 49, 50, 51, 52, 53, 54
2. 65, 66, 67, 68, 69, 70, 71, 72, 73, 74
3. Numbers from 550 to 649. 550 is halfway between 500 and 600, so we round up. All the other numbers are closer to 600 than any other hundred.

Activity

- "Work with your partner on all these problems. Be sure to justify your reasoning."
- 5–7 minutes: partner work time

Synthesis

- "How did you decide what numbers would round to 40?" (We looked at all the numbers that are closer to 40 than 50 or 30.)
- Consider asking:
    - "What does 35 round to?" (40 because it is halfway between 30 and 40)
    - "What does 45 round to?" (50 because it is halfway between 40 and 50)
- "Look at your responses for the first 2 problems. What patterns do you see in the numbers? Why is that happening?" (I see they each start with a 5 in the ones place below it because it's halfway to the nearest ten, and the numbers end with a 4 in the ones place because that is closer than the next ten.)
- "How did you use what you learned from the first 2 problems to think about the last problem?" (Instead of thinking about fives, we thought about fifties. We looked at all the numbers that are closer to 600 than 500 or 700.)
- Consider asking:
    - "What does 550 round to?" (600 because it is halfway between 500 and 600.)
    - "What does 650 round to?" (700 because it is halfway between 600 and 700.)

Advancing Student Thinking

If students don't find all the numbers that round to the given number, consider asking:

- "How did you determine that these numbers would round to ____?"
- "How could you use a number line to find all the numbers that round to ___?"

Activity 2

20 min

What's My Mystery Number?

Standards Alignments

Addressing 3.NBT.A.1

The purpose of this activity is for students to apply what they've learned about rounding to play a game in which each student generates a mystery number with three clues. The three clues describe whether the mystery number is even or odd, what it rounds to, and two numbers that it's between. It is possible that more than one number can fit the clues provided. In the synthesis, students reflect on which clues were most helpful for determining the mystery number.

Access for Students with Disabilities

Action and Expression: Internalize Executive Functions. Check for understanding by inviting students to rephrase directions in their own words. Keep a display of directions visible throughout the activity.
Supports accessibility for: Memory, Organization

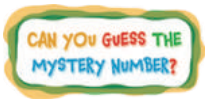
Materials to Gather

Index cards

Required Preparation

- Each student needs an index card.

Student-facing Task Statement



Write down a number between 100 and 1,000 on your index card. This is your mystery number.

Fold your index card in half so that no one can see your mystery number.

Write down 3 clues about your mystery number by finishing these sentences:

1. My mystery number is (odd or even) _____.
2. My mystery number rounds to _____.
3. My mystery number is between _____ and _____.

Play What's My Number?

1. Read the clues for your mystery number.
2. Starting with the person on your right, have every member in your team try to guess your mystery number and explain their reasoning.
3. If they haven't guessed the mystery number by the time the last person shares, reveal the mystery number.
4. Repeat steps 1 through 3 with the next person in the group reading the clues for their mystery number.

Student Responses

Answers vary.

Launch

- Groups of 4
- "We're going to play a game in which you have to guess a mystery number that someone in your group writes down."
- Choose a mystery number and give the class three clues. Play a round of the game with the class and discuss the clues. Consider using 275 and these clues:
  - "My mystery number is odd."
  - "My mystery number rounds to 300."
  - "My mystery number is between 270 and 278."
- "You'll give your group three clues by finishing three sentences. The first clue should tell whether the number is even or odd. Take a couple minutes to choose a mystery number and write down your three clues."
- 2 minutes: independent work time

Activity

- "Now, you're going to play the game with your group. Everyone will get a chance to share the clues for their mystery number. If you have time, you can each create a new mystery number with three new clues."
- 12–15 minutes: small-group work time

Synthesis

- "As you played the game, what clues were the most helpful and why?" (Knowing how the mystery number would round to the nearest ten was really helpful because that really narrowed it down. Knowing the numbers the mystery number was between was helpful if it was something like 150 and 160, but not if it was between 100 and 200.)

Lesson Synthesis

10 min

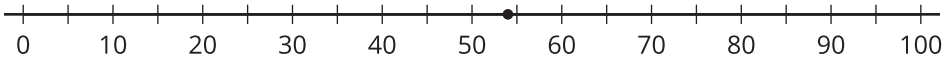
"In the last few lessons we learned about rounding to the nearest ten and hundred. What are some important things you have found helpful to remember when you are rounding?" (When rounding to the nearest ten or hundred, we round up if a number is in the middle between two multiples of 10 or 100. We can write the number on a number line to see the nearby multiples of 10 or 100. We can think about the nearest ten or hundred.)

Suggested Centers

- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Addressing)
- How Close? (1–5), Stage 4: Add to 1,000 (Addressing)
- Capture Squares (1–3), Stage 6: Multiply with 1–5 (Supporting)

Student Section Summary

In this section, we learned that rounding is a formal way to decide what number a given number is closest to. We rounded numbers to the nearest ten and the nearest hundred. We saw that a number line can help us see the closest multiple of 10 or 100.



Complete Cool-Down

Response to Student Thinking

Students do not accurately identify 2 numbers that could be Clare's number.

Next Day Support

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

Section D: Solve Two-Step Problems

Lesson 17: Does It Make Sense?

Standards Alignments

Addressing	3.OA.D.8
Building Towards	3.OA.D.9

Teacher-facing Learning Goals

- Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
- Solve two-step word problems using addition and subtraction in a way that makes sense to them.

Student-facing Learning Goals

- Let's decide if our answers make sense.

Lesson Purpose

The purpose of this lesson is for students to use mental computation and estimation strategies such as rounding to decide if answers to two-step word problems make sense.

Previously, students extended their understanding of addition and subtraction within 1,000 and learned how to round to the nearest ten and hundred. In this lesson, students work with two-step word problems and decide if a given answer for a two-step problem is reasonable. Students estimate answers to two-step problems and determine if each other's solutions make sense after they solve two-step word problems in a way that makes sense to them.

Access for:

Students with Disabilities

- Engagement (Activity 2)

English Learners

- MLR8 (Activity 2)

Instructional Routines

True or False (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

Reflect on students' assessment. Are they able to flexibly use different strategies, such as considering the answer in context, rounding, or estimating? How can you leverage their previous experiences with sense making and rounding to help them keep reasonableness in mind?

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

5 min

Beads in the Bin

Standards Alignments

Addressing 3.OA.D.8

Student-facing Task Statement

In the bin there are 124 beads. Ninety-six more beads are dumped in the bin. Then 53 beads are used to make a bracelet.

Tyler says there are 273 beads in the bin now.

Explain why Tyler's statement doesn't make sense.

Student Responses

Sample response: Tyler's statement doesn't make sense because if about 100 beads are added to 124 beads, that's about 225 beads. Then, about 50 beads are used to make a bracelet, which would take the number back down close to 175 beads. Using 50 beads to make a bracelet would make fewer beads in the bin, not more beads.

Begin Lesson

Warm-up

10 min

True or False: Is it Greater?

Standards Alignments

Building Towards 3.OA.D.9

The purpose of this True or False is to elicit strategies students have for estimating. The reasoning students do here helps to deepen their understanding of how rounding can be used to estimate. It will also be helpful later when students are to determine a reasonable estimate.

Instructional Routines

True or False

Student-facing Task Statement

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

- $132 + 115 > 200$
- $228 + 195 > 400$
- $217 + 151 > 400$

Student Responses

- True: $100 + 100$ is 200, but we still have to add 32 and 15, so it would be more than 200.
- True: $200 + 100$ is 300. When we add 28 and 95, it's going to be more than 100, so it would be more than 400.
- False: $200 + 100$ is 300. When we add 51 and 17, it's only about 70, so it wouldn't go over 400.

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 can you explain your answer without finding the value of both sides?"
- Consider asking:
  - "Who can restate ___ 's reasoning in a different way?"
  - "Does anyone want to add on to _____ 's reasoning?"
  - "Can we make any generalizations based on the statements?"
- "For which problems was rounding helpful? For which ones did you not need to round?" (For the first problem, I didn't need to round once I knew that the number was over 200. For the last problem, I rounded to add 17 and 51 just to see if it would go over 100.)

Activity 1

15 min

Quick Estimates

Standards Alignments

Addressing 3.OA.D.8

The purpose of this activity is for students to consider what it means for an answer to make sense. They see that rounding is a useful strategy to estimate the answer to a problem and determine if an answer makes sense.

The quantities chosen are close to multiples of 100 and 10 to encourage students to round as they decide if an answer makes sense. The first problem also says that "Priya makes an estimate" and "about 400 beads." If students begin computing the exact numbers of beads, remind them of the situation and that they do not need to solve to determine if the answer makes sense.

As students work, prompt them to explain their strategies for making estimates and relate them to the idea of rounding (MP3). When students use language such as "about 600 beads" to convey that they are estimating, they practice communicating with precision (MP6).

Student-facing Task Statement

1. There are 212 beads in a plastic bag. Then, 98 of the beads are used to make a necklace. Finally, 308 beads are placed in the bag.

   Priya makes an estimate that there are about 400 beads in the bag now. Does Priya's estimate make sense? Explain your reasoning.

2. Estimate the answer for each of these problems.

   a. Clare has 252 beads. She used 92 beads to make some bracelets. Then, a friend gave her 203 beads. How many beads does Clare have now?

   b. Han had 558 beads. His sister had 302

Launch

- Groups of 2
- "What does it mean for an answer to make sense? Turn and talk with your partner."
- 2 minutes: partner discussion
- Share responses.
- "In math class, we can think about whether an answer makes sense to us given the situation and the numbers in the problem. If the answer seems like it could be correct, we say it makes sense."
- "You're going to work with some problems about beads. What are some ways of using beads that you know about?" (To make bracelets or necklaces. To decorate hair. To decorate clothing.)

beads. They combined their beads for an art project that used 250 beads. How many beads do they have left?

Student Responses

1. Yes. Sample response: 212 is close to 200, 98 is close to 100 and 308 is close to 300. Subtracting 100 from 200 gives 100, and adding 300 gives 400.
2. a. About 350 beads. 252 is close to 250 and then 92 is close to 100. Take away those beads for the bracelet she made to get to 150, and add on the last 200 beads since 203 is close to 200.
   b. About 600 beads. Han has about 550 beads and his sister has about 300, so in total they have about 850. They use about 250, so there are about 600 beads left.

- 30 seconds: quiet think time
- Share responses.
- Display the problem.
- "Take 30 seconds to think about the first situation."
- 30 seconds: quiet think time

Activity

- "Work with your partner to consider Priya's estimate."
- 2–3 minutes: partner work time
- Consider asking:
  - "It says Priya makes an estimate. How could you decide without solving the problem exactly?"
  - "Do you have any strategies for estimating without solving?"
- Monitor for various student strategies, particularly a pair that uses rounding to determine if the answer makes sense.
- Select students to share strategies for evaluating Priya's answer. Be sure to include a rounding strategy.
- For the rounding strategy, ask:
  - "How did this strategy use rounding? Can you describe it in your own words?"
  - "Why is rounding helpful here?" (I can change the numbers to be easier to think about quickly.)
  - "Did you round to the nearest multiple of 10 or 100 when you were deciding if Priya's answer makes sense?"
- Consider asking:
  - "How is what _____ and _____ did similar to (or different from) your strategy for deciding if Priya's answer makes sense?"

- If no students mention rounding in their explanation, ask: "How could you use rounding to decide if Priya's answer makes sense?"
- "Work with your partner to estimate the answer for the last two problems."
- 3–5 minutes: partner work time

Synthesis

- "In general, how can rounding help us estimate?" (Sample responses: Rounding makes the numbers easier to think about quickly. Rounding to the nearest 10 or 100 means dealing only with hundreds, or with only hundreds and tens, rather than hundreds, tens, and ones.)
- "When we are deciding whether an answer makes sense, we are not solving the problem to get an exact answer. We are estimating the answer. Rounding is a strategy that can be useful when we estimate an answer."

Activity 2

20 min

Solve and Reason

PLC Activity

Standards Alignments

Addressing 3.OA.D.8

The purpose of this activity is for students to solve two-step word problems involving addition and subtraction. After students solve the problems, they trade answers with a partner to decide if their answer makes sense.

When students assess the reasonableness of each other's answers and communicate their assessment, they construct logical arguments and critique the reasoning of others (MP3).

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

Engagement: Develop Effort and Persistence. Differentiate the degree of difficulty or complexity. Some students may benefit from starting with a familiar example or one with more accessible values.
Supports accessibility for: Conceptual Processing, Social-Emotional Functioning

Student-facing Task Statement

1. Solve one of the problems. Explain or show your reasoning.
    a. Jada has 326 beads. She gives her friend 32 beads. Then, Jada uses 84 beads to make a bracelet for her cousin. How many beads does Jada have now?
    b. Noah starts an art project on Monday and uses 624 beads. On Tuesday he uses 132 more beads. Finally, on Wednesday he finishes the project by using 48 more beads. How many beads did Noah use on his art project?
2. Trade work with a partner. Decide whether your partner's answer for their problem makes sense. On their paper, explain your reasoning.

Student Responses

1. a. 210 beads. Sample response: I subtracted 32 from 326 to get 294 because she gives her friend 32 beads. Then I subtracted 84 because that's how many beads she used to make

Launch

- Groups of 2
- "Now you are going to solve for the exact answer to some problems. As you do so, think about how estimating could help you decide if an answer makes sense."

Activity

- "Work with your partner and decide who will solve each problem. Then, work independently to solve your problem."
- 3–5 minutes: independent work time
- "Now, trade work with your partner and decide whether their answer for the problem they solved makes sense."
- "Record your thoughts on your partner's paper for them to refer back to if they want to adjust their answer."
- 3–5 minutes: independent work time
- "Take turns sharing your thoughts on your partner's work. Give your partner a chance to share how they solved their problem."
- 5 minutes: partner work time

a bracelet. This gave me 210.

b. 804 beads. Sample response: I added 624 and 132 for the beads Noah used Monday and Tuesday. I added hundreds with hundreds, tens to tens, and ones to ones to get 756. Then I counted up another 48 beads for the beads he used Wednesday. $756 + 40$ is 796. Then I added 8 more to get 804.

2. Sample responses: Your answer makes sense because $326 - 32$ would be about 300, and subtracting about 80 gives about 220 and your answer was 210. Your answer does not make sense because $600 + 100$ is 700, and the other numbers add up to close to another 100, which makes about 800. Your answer was a lot less than 800, so I think there was a mistake somewhere.

Synthesis

- "What was helpful about having someone look at your work for each problem?" (They thought my answer made sense, which helped me know that I had answered correctly. They caught a mistake that I made that I didn't notice.)
- "What was helpful about looking at someone else's work for each problem?" (I was able to see a different strategy that they used for the problem. I was able to help them catch a mistake they made.)

Advancing Student Thinking

If students don't find a solution to the problems, consider asking:

- "What is this problem about? What can be counted or measured in this situation?"
- "How could you represent the problem?"

Lesson Synthesis

10 min

"Today we talked about what it means for answers to make sense. How would you describe what it means for an answer to make sense to a friend?" (It's close to the actual answer. It makes sense when I think about the numbers or what's happening in the situation. It's possible.)

"What are some ways you would know that an answer does not make sense? Give an example if it is helpful." (The size of the number doesn't make sense with the other numbers. The answer gets bigger when it should get smaller.)

Suggested Centers

- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)

Complete Cool-Down

Response to Student Thinking

Students do not explain why Tyler's statement does not make sense.

Next Day Support

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

Lesson 18: Diagrams and Equations for Word Problems

Standards Alignments

Addressing	3.OA.D.8
Building Towards	3.OA.D.8

Teacher-facing Learning Goals

- Relate diagrams and equations to two-step word problems.

Student-facing Learning Goals

- Let's connect diagrams and equations to situations.

Lesson Purpose

The purpose of this lesson is for students to relate diagrams and equations to two-step word problems.

In grade 2, students interpreted tape diagrams for one- and two-step problems involving addition and subtraction. Earlier this year, they did the same with one-step word problems involving multiplication. They also learned that a question mark, a blank line, or a box could be used to represent an unknown quantity in an equation.

In this lesson, students connect tape diagrams and equations with a symbol standing for the unknown quantity to two-step word problems. The work of this lesson prepares students to write equations with a letter standing for the unknown quantity and solve two-step problems, using a diagram if it helps them.

Access for:

Students with Disabilities

- Engagement (Activity 1)

English Learners

- MLR8 (Activity 1)

Instructional Routines

Card Sort (Activity 1), Notice and Wonder (Warm-up)

Materials to Gather

- Sticky notes: Activity 2
- Tools for creating a visual display: Activity 2

Materials to Copy

- Card Sort: Situations, Equations, and Diagrams (groups of 4): Activity 1

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

Students previously used tape diagrams to represent and solve one-step addition, subtraction, and multiplication problems. How are they leveraging that knowledge in this lesson on two-step problems?

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

5 min

Equation Match

Standards Alignments

Addressing 3.OA.D.8

Student-facing Task Statement

Andre had 451 beads. 125 beads were blue. 223 beads were pink. The rest of the beads were yellow. How many beads were yellow?

Which equation matches this situation? Explain your reasoning.

A. $451 + 125 + 223 = ?$

B. $? + 125 + 223 = 451$

C. $? = 451 + 125 – 223$

Student Responses

B. Sample response: The 125 and 223 were just part of the total of 451, so the missing number should be one of the numbers that add up to 451.

Begin Lesson

Warm-up

10 min

Notice and Wonder: Diagrams

Standards Alignments

Building Towards 3.OA.D.8

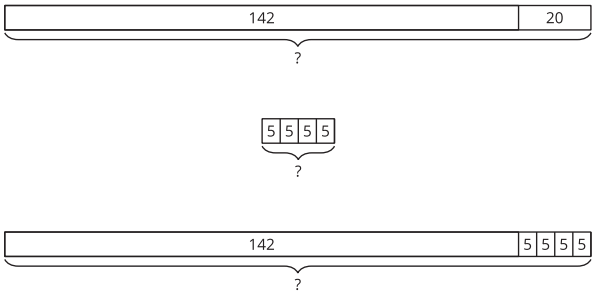
The purpose of this warm-up is to elicit the idea that diagrams can represent many operations, which will be useful when students connect diagrams to situations and equations in a later activity. While students may notice and wonder many things about these images, what operations the diagrams could represent is the important discussion point.

Instructional Routines

Notice and Wonder

Student-facing Task Statement

What do you notice? What do you wonder?



Student Responses

Students may notice:

- The diagrams have a lot of the same numbers.
- The first diagram shows 20 and the others show four 5s.
- The total is missing in all the diagrams.
- The first diagram shows addition.
- The second diagram shows multiplication.

Students may wonder:

- What is the total in each diagram?
- What operation does the last diagram show?
- Does the last diagram show multiplication and addition?

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

- "You've seen the first two types of diagrams before, when you represented addition situations and multiplication situations. We are going to make sense of the last type of diagram in today's lesson."
- "What operations do you think could be represented in the last diagram?" (It could be multiplication and addition. Like you multiply 4 times 5 and add it to 142.)
- Consider asking:
    - "Could the last diagram represent addition and multiplication?"

Activity 1

15 min

Card Sort: Situations, Equations, and Diagrams

Standards Alignments

Addressing 3.OA.D.8

The purpose of this activity is for students to connect two-step word problems, diagrams, and equations with a symbol for the unknown quantity. Interpreting and relating given representations prepare students to use these as tools for reasoning when they solve two-step word problems.

As students analyze written statements and other representations and make connections among them, they reason quantitatively and abstractly (MP2).

Access for English Learners

MLR8 Discussion Supports: Students should take turns finding a match and explaining their reasoning to their partner. Display the following sentence frames for all to see: "I noticed _____ , so I matched . . . ." Encourage students to challenge each other when they disagree.
Advances: Listening, Speaking

Access for Students with Disabilities

Engagement: Develop Effort and Persistence. Chunk this task into more manageable parts. Give students a subset of the cards to start with and introduce the remaining cards once students have completed their initial set of matches.
Supports accessibility for: Visual-Spatial Processing, Attention

Instructional Routines

Card Sort

Materials to Copy

Card Sort: Situations, Equations, and Diagrams (groups of 4)

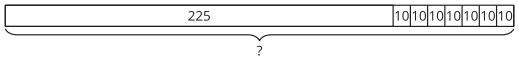
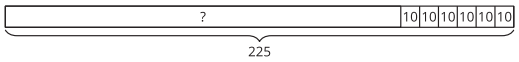
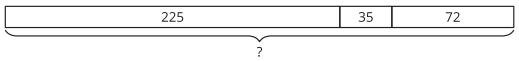
Required Preparation

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

Student-facing Task Statement

Your teacher will give you a set of cards showing situations, equations, and diagrams.

Sort the cards into groups so that the cards in each group represent the same situation. Be ready to explain your reasoning.

A	Clare had 225 beads. A friend gave her a pack of 48 beads. Then she used 70 beads to make a necklace. How many beads does Clare have now?
B	
C	$225 - (6 \times 10) = ?$
D	Elena has 7 notebooks. Each notebook has 10 paper clips in it. Elena also has a box of 225 paper clips. How many paper clips does Elena have?
E	$225 + (6 \times 10) = ?$
F	$? = 225 + 48 - 70$
G	Andre has 225 crayons. He buys 6 more packs and each pack has 10 crayons. How many crayons does Andre have now?
H	
I	Diego has a collection of 225 baseball cards. He gets 35 more cards from a friend, then buys 72 cards. How many cards does Diego have now?
J	Han has 225 beads. Then he makes 6 bracelets for his friends. Each bracelet has 10 beads. How many beads does Han have now?
K	
L	$? = (7 \times 10) + 225$

Launch

- Groups of 4
- Distribute one set of pre-cut cards to each group of students.

Activity

- "This set of cards includes situations, equations, and diagrams. Work with your partner to find the cards that belong together because they represent the same situation. Be prepared to explain your decisions."
- 8 minutes: small-group work time

Synthesis

- "Were there any cards whose placement you disagreed on? How did you come to an agreement?" (We went back and read the situation carefully together.)
- Choose a set of cards that belong together, such as B, D, and L, to discuss in detail. Ask, "How do the equation and diagram represent the situation?"
- Attend to the language that students use to describe their matches and the situations, equations, and diagrams, giving them opportunities to describe them more precisely.

Student Responses

A and F
B, D, and L
C, H, and J
E and G
I and K

Sample response: I know that B, D, and L match because the bar of 225 represents the box of 225 paper clips and the 7 boxes of 10 represent the paper clips in the notebooks. To know how many paper clips Elena has, we would have to add all of this up, which is shown in the equation and in the diagram.

Activity 2

20 min

Makes Sense to Me: A Gallery Walk

Standards Alignments

Addressing 3.OA.D.8

The purpose of this activity is for students to solve one of the problems from the card sort in the previous activity and examine their classmates' solutions to other problems. Students work in groups to create a poster of their solution. As students visit the posters, they leave comments about how they know the solution on the poster makes sense. As students make comments on the work of others, they critique the reasoning of others (MP3).

Materials to Gather

Sticky notes, Tools for creating a visual display

Student-facing Task Statement

1. Your teacher will assign a problem to your group. Work together to solve your assigned

Launch

- Groups of 4

problem.

2. Create a poster of your group's solution. Organize your work so that it can be followed by others.
3. As you visit other groups' posters, consider how each answer makes sense.

   Choose one poster and make a comment on the solution. Write on your sticky note how you know the answer makes sense.

Student Responses

1. Situation A: 203 beads
   Situation D: 295 paper clips
   Situation G: 285 crayons
   Situation I: 332 baseball cards
   Situation J: 165 beads
2. No response required.
3. Sample response: I estimated the answer to be about 325 since $225 + 30 + 70 = 325$, so your answer makes sense.

- Assign each group a situation from the previous activity.
- Give each group tools for creating a visual display and sticky notes.

Activity

- "Now you are going to solve a problem from the card sort with your group."
- "After you've solved the problem together, create a poster that shows your solution strategy."
- 8–10 minutes: small-group work time

Synthesis

- Display posters around the room. If more than one group solved the same problem, consider grouping their posters together.
- Give each student a sticky note.
- "As you visit the posters, leave a comment on one poster that explains how you know the answer makes sense."

Advancing Student Thinking

If students try to find exact answers to determine if their peers' solutions make sense, consider asking:

- "What are some ways that we could determine if the solution makes sense without solving the problem?"
- "How could we use estimating to determine if the solution makes sense? How could we use rounding?"

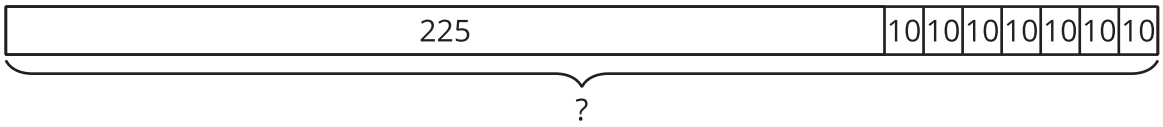
Lesson Synthesis

10 min

Display a corresponding set of cards that show a diagram, situation, and equation representing the same situation, such as B, D and L:

Elena has 7 notebooks. Each notebook has 10 paper clips in it. Elena also has a box of 225 paper clips. How many paper clips does Elena have?

$? = (7 \times 10) + 225$



"How does the diagram or equation help you illustrate or clarify your understanding of the situation?" (Seeing the parts of the situation in the diagram helps me understand how they go together, what we know, or what is missing. The equation helps me understand how the quantities in the situation are related to each other by addition or multiplication.)

Suggested Centers

- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)
- Five in a Row: Multiplication (3–5), Stage 2: Factors 1–9 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students select an equation that doesn't represent the situation.

Next Day Support

- During the launch of the next day's activity, have students discuss how the second equation matches the situation, specifically what the numbers and the letter represent.

Lesson 19: Situations and Equations

Standards Alignments

Addressing 3.OA.D.8

Teacher-facing Learning Goals

- Represent and solve two-step word problems using equations with a letter standing for the unknown quantity.

Student-facing Learning Goals

- Let's represent and solve problems.

Lesson Purpose

The purpose of this lesson is for students to represent and solve two-step word problems.

In this lesson, students are able to apply what they have learned in this section to write equations that represent two-step word problems using a letter for the unknown quantity. They persevere to solve two-step word problems, and decide if their answer makes sense (MP1).

Access for:

Students with Disabilities

- Engagement (Activity 2)

English Learners

- MLR5 (Activity 2)

Instructional Routines

Notice and Wonder (Warm-up)

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

Who has been sharing their ideas in class lately? Make a note of students whose ideas have not been featured in class and look for an opportunity for them to share their thinking in tomorrow's lesson.

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

5 min

How Many Beads?

Standards Alignments

Addressing 3.OA.D.8

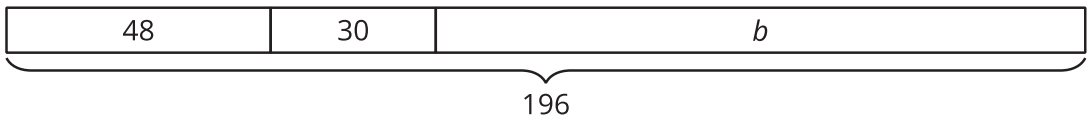
Student-facing Task Statement

Andre has 196 beads. He uses 48 beads to make a craft. Then he gives 30 beads to a friend. How many beads does Andre have left?

1. Write an equation with a letter for the unknown quantity to represent this situation.
2. Solve the problem. Explain or show your reasoning.

Student Responses

1. $196 - 48 - 30 = b$
2. 118 beads. Sample response:



Begin Lesson

Warm-up

10 min

Notice and Wonder: The Unknown

Standards Alignments

Addressing 3.OA.D.8

The purpose of this warm-up is to elicit the idea that letters can be used to represent an unknown quantity in a tape diagram and an equation, which will be useful when students represent unknown quantities in word problems later in the lesson. While students may notice and wonder many things

about these images, the fact that a letter can be used to represent an unknown in the same way as a question mark, line, or box is the important discussion point.

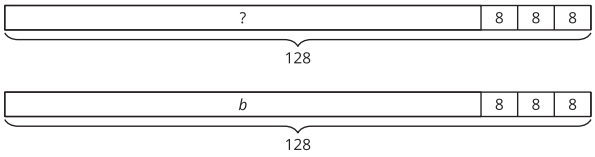
When students articulate what they notice and wonder, they have an opportunity to attend to precision in the language they use to describe what they see (MP6). They might first propose less formal or imprecise language, and then restate their observation with more precise language in order to communicate more clearly.

Instructional Routines

Notice and Wonder

Student-facing Task Statement

What do you notice? What do you wonder?



Student Responses

Students may notice:

- The total in both diagrams is 128.
- There are 3 parts that have 8. This could be expressed as 3×8.
- There's a question mark in the large section in one diagram, but a letter in the other.

Students may wonder:

- Why does one have a question mark and one has the letter b?
- What problem could this diagram represent?

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

- "These diagrams show us that we can use a letter to represent an unknown quantity just like we have used a question mark, line, or box in previous lessons. We will explore this idea further during today's lesson."

Activity 1

20 min

Mai's Beads

Standards Alignments

Addressing 3.OA.D.8

The purpose of this activity is for students to match tape diagrams, equations, and descriptions of situations and explain the connection to model with mathematics (MP4). The situations share the same context and numbers. Students consider how different unknown quantities are reflected in the diagrams, depending on what's happening in the situations.

When students relate the quantities and relationships in situations to the equations and diagrams that represent them, they reason quantitatively and abstractly (MP2).

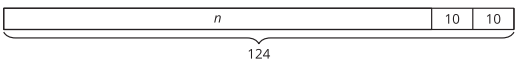
Student-facing Task Statement

Part 1

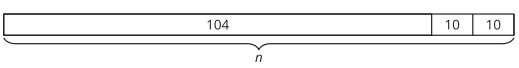
Match each diagram with a situation. Be ready to explain your reasoning.

- Situation 1: Mai had 104 beads. She bought two packs of beads and now she has 124 beads. How many beads were in each pack?
- Situation 2: Mai had some beads. She bought 2 more packs of beads and each pack has 10 beads in it. Now she has 124 beads. How many beads did Mai have before?
- Situation 3: Mai had 104 beads. She bought 2 more packs of beads and each pack has 10 beads in it. How many beads does she have now?

A



B



C

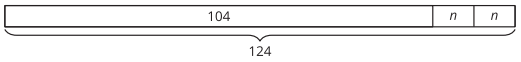
Launch

- Groups of 3

Activity

Part 1

- "Each member of your group should pick one of the situations to read silently. Make sense of your situation and be ready to explain to your group what is happening in your situation."
- 2 minutes: quiet think time
- "Take turns sharing your understanding of the situation you chose."
- "When each person has shared, work together to match each situation to a diagram. Be prepared to explain how you know they match."
- 5–7 minutes: small-group work time
- Display the three diagrams together.
- "Turn and talk with your group. How are the diagrams alike? How are they different?" (Alike: They have the same numbers. They have the same structure with a long rectangle and 2 smaller parts. Different: A different number is missing in each one. The n moves around.)



Part 2

Match each equation with a letter for the unknown quantity to a situation in Part 1.

1. $104 + 2 \times 10 = n$
2. $104 + (2 \times n) = 124$
3. $n + 10 + 10 = 124$

Student Responses

Part 1

1. C, because we can see the 104 beads she had, that she has 124 altogether, and the packs that she bought, but not how many are in each pack.
2. A, because we can see how much she has all together and the 2 packs of 10, but not how much she had before.
3. B, because we can see she started with 104 and the two packs as the two parts with 10, but you don't know how many she has altogether.

Part 2

1. Situation 3
2. Situation 1
3. Situation 2

- 2–3 minutes: small-group discussion
- Share responses.
- "How did you connect the diagrams to the situations?" (The location of the unknown shows what we are missing in the situation. The first diagram matches the situation where we don't know how many beads Mai starts with. The second diagram matches the situation where we are missing the total number of beads. In the last diagram, we don't know how many beads are in the 2 packs she bought.)
- 2–3 minutes: small-group discussion
- Share responses.

Part 2

- "Now you are going to match an equation to each situation from Part 1. Each letter in the equation represents the unknown quantity in the situation."
- 3–5 minutes: small-group work time
- Monitor for groups who can articulate connections between each equation and the corresponding situation. Identify students to share during synthesis.

Synthesis

- For each situation, select a previously identified student to share how the matching equation makes sense.

Activity 2

15 min

Represent, Solve, Explain

Standards Alignments

Addressing 3.OA.D.8

Previously, students matched diagrams and equations to situations with an unknown quantity. Here, they generate such equations, using a letter for the unknown quantity, solve problems, and explain how they know their answers makes sense. Students should be encouraged to use any solving strategy they feel comfortable with. If not yet addressed, mention that any letter can be used for the unknown quantity in their equation.

While this activity is focused on independent practice, encourage students to discuss the problem with a partner if needed. Though the task asks students to write an equation first, students may complete the task in any order that makes sense to them.

Students reason abstractly and quantitatively when they write an equation that represents the situation (MP2). They also practice making sense of a problem and its solution in terms of the context (MP1).

Access for English Learners

MLR5 Co-Craft Questions: Keep books or devices closed. Display only the problem stem, without revealing the question, and ask students to write down possible mathematical questions that could be asked about the situation. Invite students to compare their questions before revealing the task. Ask, "What do these questions have in common? How are they different?" Reveal the intended questions for this task and invite additional connections.
Advances: Reading, Writing

Access for Students with Disabilities

Engagement: Develop Effort and Persistence. Differentiate the degree of difficulty or complexity. Some students may benefit from starting with a familiar example or one with more accessible values before working independently on the three parts to the activity.
Supports accessibility for: Social-Emotional Functioning, Conceptual Processing

Student-facing Task Statement

Kiran is setting up a game of mancala. He has a jar of 104 stones.

From the jar, he takes 3 stones for each of the 6 pits on his side of the board.

How many stones are in the jar now?

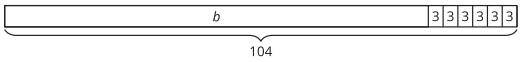
Launch

- Groups of 2
- "Stones are sometimes used to play games. One of the games that can be played with stones is mancala. In mancala, stones are moved from pit to pit and players try to capture the other player's stones. The picture shows a game of mancala in progress."
- "Now we're going to solve a problem about the stones in a game of mancala."

1. Write an equation to represent the situation. Use a letter for the unknown quantity.
2. Solve the problem. Explain or show your reasoning.
3. Explain how you know your answer makes sense.

Student Responses

1. Sample response: $104 - (6 \times 3) = b$
2. 86 stones



3. Sample responses:
   When Kiran took the stones from the jar the amount should have gotten smaller and 86 is less than 104.

   The problem was $104 - 18$. If I round both of these numbers, that's $100 - 20$, which is 80. My answer was close to 80 so it makes sense.

- "What are some ways you will be able to determine if your answer makes sense?" (I can estimate an answer using rounding. I can think about the size of the numbers in the problem.)
- Share and record responses.

Activity

- "Take some independent time to work on this problem. You can choose to solve the problem first or write the equation first."
- 5–7 minutes: independent work time
- Monitor for different ways students:
  - write an equation
  - represent the problem, such as by using a tape diagram
  - decide their answer makes sense, such as thinking about the situation or by rounding

Synthesis

- Invite students to share the equations they wrote.
- Discuss differences in equations students wrote. Consider asking: "_____ wrote _____ and _____ wrote _____. How are those equations alike and different?" (I used a different letter for my unknown. I wrote 3×6 instead of 6×3.)
- Have several students share different strategies used to solve the problem. Try to feature a student-drawn tape diagram.
- Consider asking:
  - "Did anyone solve the problem in a different way?"
  - "Did anyone use a tape diagram to solve?"
  - "How did you know if your answer made sense?"

Advancing Student Thinking

If students don't find a solution to the problem, consider asking:

- "What is this problem about? What can be counted or measured in this situation?"
- "How could you represent the problem?"

Lesson Synthesis

10 min

"During the last few lessons, we have represented situations with equations that have a symbol or letter for an unknown quantity. We have also used diagrams to help us solve problems."

"What do you have to think about to represent and solve problems?" (I can draw a diagram first so that I can imagine the situation, then I can write the equation more easily. I can write the equation first so I see how the numbers are related. It helps me to round numbers and think about what the answer should be close to first.)

Suggested Centers

- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)
- Five in a Row: Multiplication (3–5), Stage 2: Factors 1–9 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students represent the problem with an equation with a symbol for the unknown instead of a letter.

Next Day Support

- During the launch of the next day's activity, have students brainstorm letters that could be used to replace the symbol based on what the letter represents.

Lesson 20: More Practice to Represent and Solve

Standards Alignments

Addressing 3.OA.C.7, 3.OA.D.8

Teacher-facing Learning Goals

- Represent and solve two-step word problems.

Student-facing Learning Goals

- Let's represent and solve more problems.

Lesson Purpose

The purpose of this lesson is for students to continue to represent and solve two-step word problems, including problems in which not all necessary information is given up front.

In this lesson, students continue to solve problems but encounter those that cannot be solved right away because of missing information. They learn the Information Gap routine, which prompts them to consider the information that is needed to solve a problem and ways to ask for it.

The first activity introduces students to the routine. In the second activity, students are given more time to solve two-step word problems as they engage in the routine.

This lesson has a Student Section Summary.

Access for:

Students with Disabilities

- Representation (Activity 2)

Instructional Routines

MLR4 Information Gap (Activity 1, Activity 2), Number Talk (Warm-up)

Materials to Copy

- Info Gap: Bake Sale (groups of 2): Activity 2

Lesson Timeline

Warm-up	10 min

Teacher Reflection Question

How did the Information Gap routine support students in making sense of two-step problems?

Activity 1	15 min
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

Reflection

Standards Alignments

Addressing 3.OA.D.8

Student-facing Task Statement

Describe something you really understand well after today's lesson or describe something that was confusing or challenging.

Student Responses

Answers vary.

Begin Lesson

Warm-up

10 min

Number Talk: Two Steps

Standards Alignments

Addressing 3.OA.C.7

The purpose of this Number Talk is to elicit strategies students have for multiplying single-digit factors and adding two-digit numbers. The expressions involve two operations. They encourage students to look for and make use of structure as they use their understanding of equal-size groups and properties of operations to find products and sums (MP7). The reasoning here will be helpful later when students

solve two-step word problems.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $20 + (2 \times 3)$
- $30 + (4 \times 3)$
- $50 + (8 \times 3)$
- $99 + (8 \times 3)$

Student Responses

- 26: Two groups of 3 is 6, and $20 + 6 = 26$.
- 42: I know that 4×3 is 2 times 2×3 or 2×6, which is 12, and $30 + 12 = 42$.
- 74: I know 8×3 is twice 4×3, so it is $12 + 12$, which is 24. Adding 50 and 24 gives 74.
- 123: It's like the one right before it, but you have to add 99 and 24 instead of 50 and 24. Adding 24 to 100 gives 124, so adding 24 to 99 gives 123.

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

- "How did the first two expressions help you find the value of the last two expressions?"
- 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 problem in a different way?"
  - "Does anyone want to add on to _____'s strategy?"

Activity 1

15 min

Info Gap: Introduction

Standards Alignments

Addressing 3.OA.D.8

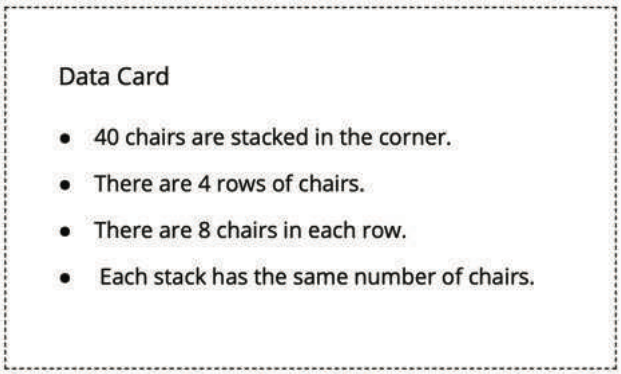
The purpose of this activity is to introduce students to the structure of the MLR4 Information Gap routine. This routine facilitates meaningful interactions by positioning some students as holders of information that is needed by other students.

Tell students that first, a demonstration will be conducted with the whole class, in which they are playing the role of the person with the problem card. Explain to students that it is the job of the person with the problem card (in this case, the whole class) to think about what information they need to answer the question.

For each question that is asked, students are expected to explain what they will do with the information, by responding to the question, "Why do you need to know (that piece of information)?" If the problem card person asks for information that is not on the data card (including the answer!), then the data card person must respond with, "I don't have that information." In explaining their answers, students need to be precise in their word choice and use of language (MP6).

Once the students have enough information to solve the problem, they solve the problem independently.

The info gap routine requires students to make sense of problems by determining what information is necessary and then ask for information they need to solve them. This may take several rounds of discussion if their first requests do not yield the information they need (MP1).



Instructional Routines

MLR4 Information Gap

Student-facing Task Statement

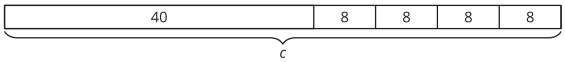
Problem Card

A room has some chairs set up in rows and some chairs stacked up in a corner.

How many chairs are in the room?

Student Responses

72 chairs. Sample response: $40 + (4 \times 8) = 72$



Launch

- Groups of 2
- "The problems in this lesson are about setting up for a special event at a school. What's your favorite special event at school or in your community?"
- Share responses.

Activity

MLR4 Information Gap

- Display the Sample Problem Card.
- Read the problem aloud.
- Listen for and clarify any questions about the context.
- "Some of the information you need to solve this problem is missing, and I have it here. What specific information do you need?"
- 1–2 minutes: quiet think time
- "With your partner, decide what information you need to solve the problem, and create a list of questions you can ask to find out."
- 2–3 minutes: partner discussion
- Invite students to share 1 question at a time.
- Record each question on a display, and respond with: "Why do you need to know (restate the information requested)?" Students should provide a justification for how they will use the information before the information is revealed.
- Answer questions using only information stated on the Sample Data Card (do not reveal).
- Record information that is shared on the display. Give students time to decide whether they have enough information to solve the problem.
- Repeat until students decide they have

enough information to solve, then ask students to solve.

- 2–4 minutes: independent work time

Synthesis

- Invite 1–2 students to share how they solved the problem.
- "Which questions helped you find out how many chairs were in the room?" (How many chairs were in the corner? How many chairs were in each row? How many rows were there?)
- If there were any questions that the data card cannot answer, discuss them here.

Activity 2

20 min

Info Gap: Bake Sale

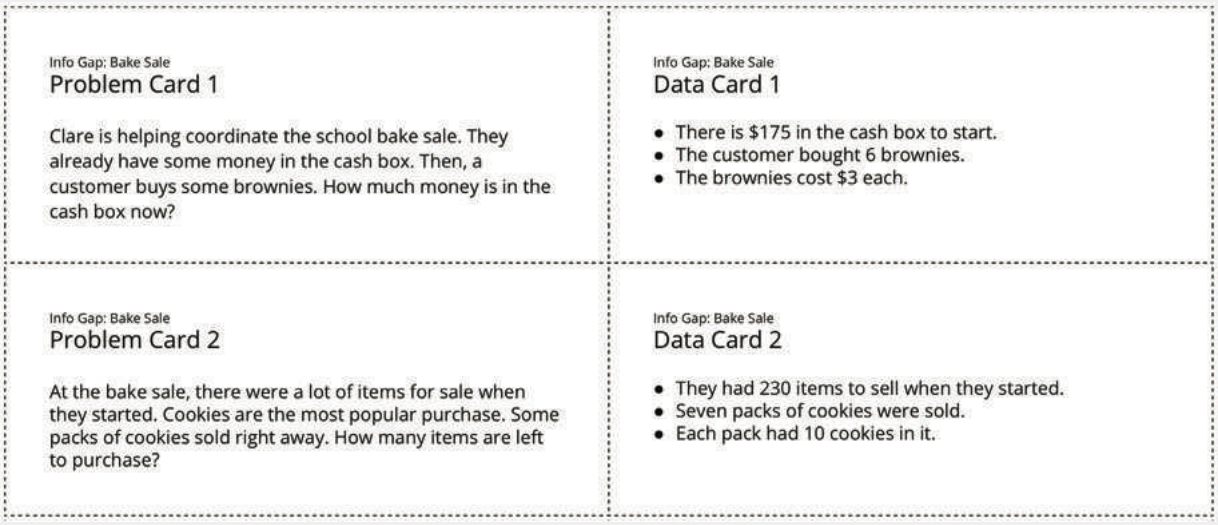
Standards Alignments

Addressing 3.OA.D.8

This Info Gap activity gives students an opportunity to determine and request information needed to solve a two-step problem that involves multiplication.

The Info Gap structure requires students to make sense of problems by determining what information is necessary, and then to ask for information they need to solve it. This may take several rounds of discussion if their first requests do not yield the information they need (MP1). It also allows them to refine the language they use and ask increasingly more precise questions until they get the information they need (MP6).

Here is an image of the cards for reference:



Access for Students with Disabilities

Representation: Access for Perception. Begin by giving a physical demonstration of the activity's procedure to support understanding of the activity and understanding of the context.
Supports accessibility for: Social-Emotional Functioning, Memory

Instructional Routines

MLR4 Information Gap

Materials to Copy

Info Gap: Bake Sale (groups of 2)

Required Preparation

- Create a set of cards from the Instructional master for each group
- of 2. Keep set 1 separate from set 2.

Student-facing Task Statement

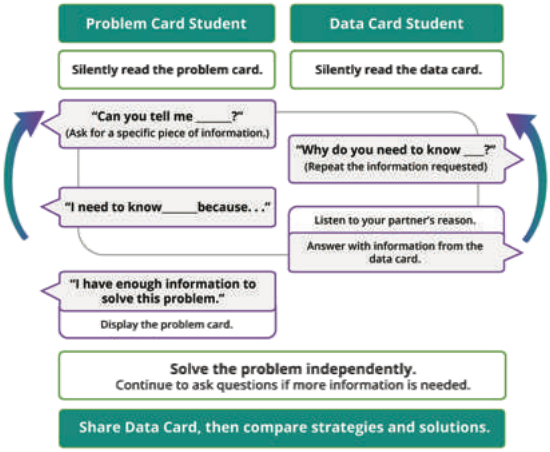
Your teacher will give you either a problem card or a data card. Do not show or read your card to your partner.

Launch

- Groups of 2

MLR4 Information Gap

- Display the task statement, which shows a diagram of the Info Gap structure.
- 1–2 minutes: quiet think time



Pause here so your teacher can review your work.

Ask your teacher for a new set of cards and repeat the activity, trading roles with your partner.

Student Responses

1. $193. Sample response:
   Six groups of $3 is $18 for the brownies, and that gets added to the $175 she already had.
2. 160 items. Sample response:
   If the 7 packs of cookies have 10 cookies each, that is 70 cookies. We can take 70 away from 230 to get 160.

- Read the steps of the routine aloud.
- "I will give you either a problem card or a data card. Silently read your card. Do not read or show your card to your partner."
- Distribute the cards.
- 1–2 minutes: quiet think time
- Remind students that after the person with the problem card asks for a piece of information the person with the data card should respond with "Why do you need to know (restate the information requested)?"

Activity

- 3–5 minutes: partner work time
- After students solve the first problem, distribute the next set of cards. Students switch roles and repeat the process with Problem Card 2 and Data Card 2.

Synthesis

- "What kinds of questions were the most useful to ask?"
- Select 1–2 students to share different strategies used to solve one of the problems. Try to feature a student-drawn tape diagram.
- Consider asking:
  - "Did anyone solve the problem in a different way?"
  - "Did anyone use a tape diagram?"
  - "How did you know if your answer made sense?"
  - "How could we represent the second problem with an equation with a letter for the unknown quantity?" $(230 - (7 \times 10) = d)$

Lesson Synthesis

10 min

"Today we learned the Information Gap routine. How did this routine help you make sense of the problems you solved?" (The routine gave me a chance to focus on what was important in the problem. I had to think about what I needed to know to solve the problem. I had to think about why some information was needed to solve the problem. It helped me make sense of what was happening in the problem.)

Suggested Centers

- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)
- Five in a Row: Multiplication (3–5), Stage 2: Factors 1–9 (Supporting)

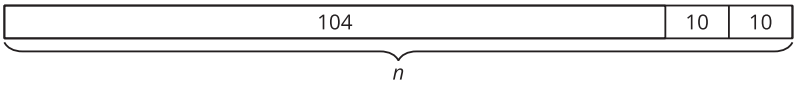
Student Section Summary

In this section, we used rounding to estimate answers to problems. This helped us decide if our answers to problems made sense based on the situation and the numbers in the situation.

We also wrote equations with an unknown and used diagrams to solve for the exact answer in problems.

Situation: Mai had 104 beads. She bought 2 more packs of beads and each pack has 10 beads in it. How many beads does she have now?

Diagram:



Equation with an unknown: $104 + (2 \times 10) = n$

Lesson 21: Classroom Supplies (Optional)

Standards Alignments

Addressing	3.NBT.A.1, 3.NBT.A.2
Building Towards	3.NBT.A.1, 3.NBT.A.2

Teacher-facing Learning Goals

- Add and subtract within 1,000 to solve real-world problems.
- Round whole numbers to the nearest ten or hundred to solve problems.

Student-facing Learning Goals

- Let's make a wish list for class supplies.

Lesson Purpose

The purpose of this lesson is for students to use their understanding of estimation, rounding, and addition within 1,000 to solve a problem about a class wish list.

This lesson is optional because it does not address any new mathematical content standards. It does provide students with an opportunity to apply precursor skills of mathematical modeling.

In this lesson, students put together a wish list of supplies they would like to get for their classroom given a large collection of choices and their costs. They are given a budget and freedom to decide how to spend the money. As they make choices, students round the costs before they check the total amount they are spending. Students then compare their wish list with a partner group. Groups compare their wish lists and how much they spent in each category.

When students make decisions and choices, adhere to mathematical constraints, interpret a mathematical answer in context, organize data, make revisions, and report results, they model with mathematics (MP4).

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Notice and Wonder (Warm-up)

Lesson Timeline

Warm-up	10 min
Activity 1	25 min
Activity 2	15 min
Lesson Synthesis	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 their classmates' ideas in future lessons?

Begin Lesson

Warm-up

10 min

Notice and Wonder: School Supplies List

Standards Alignments

Building Towards 3.NBT.A.1, 3.NBT.A.2

The purpose of this warm-up is to elicit observations about school supplies in different categories and with varying prices, familiarizing students with the context for upcoming work. While students may notice and wonder many things, focus the discussion on the large selection and wide range of prices.

Instructional Routines

Notice and Wonder

Student-facing Task Statement

What do you notice? What do you wonder?

work supplies	cost
box of 25 markers	$5
box of 100 crayons	$8

class library	cost
set of 20 books about history	$250
story book (80 to choose from)	$8

Launch

- Groups of 2
- Display the table.
- "What do you notice? What do you wonder?"
- 1 minute: quiet think time

Activity

- "Discuss your thinking with your partner."

special items	cost
carpet for the reading corner	$65
a class aquarium, with fish	$159

entertainment	cost
board games (40 to choose from)	$15
interactive computer games (math and reading)	$75

Student Responses

Students may notice:

- There are different categories.
- This looks like a list of school supplies.
- Some items are much more expensive than others.
- Some of the things have different options.

Students may wonder:

- What kinds of story books are available?
- Why are some things much more expensive than others?
- How much does the whole list cost if we buy everything on it for our class?
- What board games are available?

- 1 minute: partner discussion
- Share and record responses.

Synthesis

- "If you had to pick one item from this list for our classroom, what would you pick?"
- "What is one other thing you would like to get for our classroom that is not on this list?"
- 30 seconds: quiet think time
- Share and record responses.

Activity 1

25 min

Make a Wish List

Standards Alignments

Addressing 3.NBT.A.1, 3.NBT.A.2

The purpose of this activity is for students to make a wish list of items for the classroom with a $1,000 budget. As they make their selections, they keep an estimate of the total by rounding, and use estimation and addition strategies to remain within the budget. To make their wish list, students use a supply list that is longer than shown in the warm-up.

Access for Students with Disabilities

Representation: Internalize Comprehension. Chunk this task into more manageable parts. Some students may benefit from adding a third column to the supply lists that they can use to record rounded costs before they begin selecting items.
Supports accessibility for: Organization, Conceptual Processing

Student-facing Task Statement

Imagine our class received $1,000 to spend on school supplies from the given list. How would you spend the money to benefit our classroom the most?

work supplies	cost
box of 25 markers	$5
box of 100 crayons	$8
box of 60 pencils	$5
box of 5,000 pages of printer paper	$40
package of 10 pads of lined paper	$15
box of 50 pieces of construction paper	$32

class library	cost
set of 20 books about history	$250
set of books about nature	$400
story book (80 choices)	$8
maps (5 choices: world, continent, North America, U.S. state, U.S. city)	$45

special items	cost
carpet for the reading corner	$65
a class aquarium, with fish	$150
fish food for one month	$15
field trip to the zoo	$350

entertainment	cost
puzzles (30 choices)	$12
board games (40 choices)	$15
interactive computer games (math and reading)	$75

Launch

- Groups of 2
- "Imagine our class got a donation of $1,000 to spend on anything we'd like from the list."
- "Today you will get to decide how to spend $1,000. As you make your choices, estimate or round to keep track of your total until you get close to $1,000."

Activity

- 2 minutes: independent work time
- 10-12 minutes: partner work time
- Monitor for a variety of addition strategies students use to keep track of their budget.
- Monitor for students who:
  - round to the nearest ten
  - round before multiplying or round after multiplying the quantity
  - revise their list if they were under or over budget

Synthesis

- Invite previously selected students to share why they made revisions to their wish list.
- "Turn and talk: How did you make your choices?" (Rationale can go beyond the cost of items, such as students liking a specific item or stating the need for an item.)

1. Make a plan on how to spend the money. You may purchase more than one of the same item. Use estimation or rounding to keep track of the total as you make your selections.
2. On your wish list, what is the total cost of the items in each category?
    - Supplies
    - Books and maps
    - Puzzles and games
    - Special items
3. What was the total cost of all your choices?
    a. Would you have any money left over? If so, how much?
    b. Did you spend too much money? If so, how much?

Student Responses

1. Sample response
   Estimate:
   $30 + 20 + 50 + 400 + 150 + 350 = 1{,}000$
    - 6 boxes of markers: $6 \times 5 = 30$
    - 1 package of pads of lined paper: 15
    - 6 boxes of crayons: $6 \times 8 = 48$
    - set of nature books: 400
    - 10 board games: $10 \times 15 = 150$
    - field trip to the zoo: 350
2. Sample responses:
    - Supplies: $93
    - Books and maps: $400
    - Puzzles and games: $150
    - Special items: $350
3. Sample responses: The total cost for all our choices was $993.
    a. We had $7 left over.
    b. We didn't spend too much money.

- Share responses.
- "Did your actual cost go over the $1,000 or stay under?"
- "Did rounding affect whether your actual costs were over or under $1,000? If so, how?" (My rounding made my actual cost stay under because I rounded up a lot when I estimated the cost. My actual cost went over because I rounded down a lot.)

Activity 2

15 min

What's on Your List?

Standards Alignments

Addressing 3.NBT.A.2

In this activity, students present their selections to a partner group. They explain their choices and compare how much money they plan to spend in each category. They make comparisons using "how much more" and "how much less" statements.

Access for English Learners

MLR8 Discussion Supports. Synthesis: Display sentence frames to support whole-class discussion: "Can you say more about . . .?" "Why did you . . .?"
Advances: Speaking, Representing

Student-facing Task Statement

1. Share your wish list with another group. Take turns to explain how you made your choices and listen to the choices of the other group.
2. Compare your spending:
    - How much more or less did you choose to spend on each category than the other group?
    - How much more or less did you spend in total compared to your partner group?

Student Responses

1. Sample response: First we picked some expensive items, the set of nature books and the field trip. Then, we chose the 10 board games. We then knew that we had spent $900 and had $100 left over. Then we

Launch

- Groups of 2
- "Now, share your wish lists with another partnership. Take turns sharing what you chose and explain the choices you made."
- Pair each group with another group to share.

Activity

- 10-12 minutes: small-group work time
- Monitor for "more than" and "less than" language when students make comparisons.

Synthesis

- Invite groups to share how their strategies compared to those of their partner groups.
- Invite partner groups to share their

chose work supplies to get close to $100.

2. Sample responses:
    - Group A spent $15 more on supplies than group B.
    - Group A spent $100 less on library items than group B.
    - Group A spent $50 more on entertainment than group B.
    - Group A spent $35 more on special items.
    - Group A spent $23 less than group B.

comparisons with the whole class using "how much less" and "how much more" statements.

Lesson Synthesis

10 min

"Today, we made decisions to buy helpful and beneficial materials for the class. Unfortunately, there wasn't enough money to buy everything on the list."

"What else would you get if we had more money?"

"Which item on the list has the greatest benefit for the class?" (I think the fish would have the most value because we get to learn about science as we take care of the fish and how to be responsible for a pet.)

Consider asking, "What are some other things you would buy for the class that are not on the list?"

Suggested Centers

- Tic Tac Round (3–5), Stage 1: Nearest Ten or Hundred (Addressing)
- Number Puzzles: Addition and Subtraction (1–4), Stage 5: Within 1,000 (Addressing)
- Five in a Row: Multiplication (3–5), Stage 2: Factors 1–9 (Supporting)

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Family Support Materials

Family Support Materials

Wrapping Up Addition and Subtraction Within 1,000

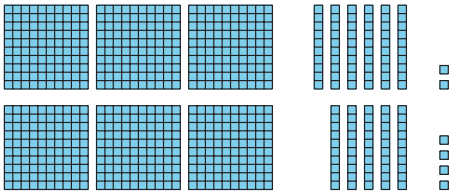
In this unit, students use their understanding of place value to round whole numbers and to add and subtract within 1,000. They also solve two-step problems.

Section A: Add within 1,000

In this section, students revisit numbers within 1,000 and consider ways to decompose (break apart) the numbers based on place value (hundreds, tens, and ones). To add and subtract numbers within 1,000, they start by using diagrams and strategies learned in grade 2. Then, they make sense of algorithms (steps that work every time, no matter the numbers involved) that make adding more efficient.

For example, here are three ways to find the value of $362 + 354$:

using base-ten blocks or diagrams



using expanded form

$$\begin{array}{rr} & 300 + 60 + 2 \\ + & 300 + 50 + 4 \\ \hline & 600 + 110 + 6 \end{array}$$

recording partial sums vertically

$$\begin{array}{rrrr} & 3 & 6 & 2 \\ + & 3 & 5 & 4 \\ \hline & & & 6 \\ & 1 & 1 & 0 \\ + & 6 & 0 & 0 \\ \hline & 7 & 1 & 6 \end{array}$$

Using the standard algorithm for addition is not required until grade 4. Students who already know the standard algorithm still need to make sense the role of place value in the algorithm to support their work with decimals and fractions in future grades.

Section B: Subtract within 1,000

In this section, students analyze and use algorithms for subtraction, while continuing to use base-ten blocks and diagrams to think about subtraction. They notice that it is difficult to use drawings to show a hundred being decomposed or regrouped into tens (or a ten into ones), and that an algorithm is helpful.

Students make sense of a subtraction algorithm that uses expanded form to show how numbers are being regrouped. This non-conventional notation allows students to see the meaning behind the digits above the numbers in the standard algorithm.

subtracting using expanded form

$$\begin{array}{rrrrrr} & \overset{400}{\cancel{5}00} & + & \overset{120}{\cancel{2}0} & + & 8 \\ - & 200 & + & 70 & + & 1 \\ \hline \end{array}$$

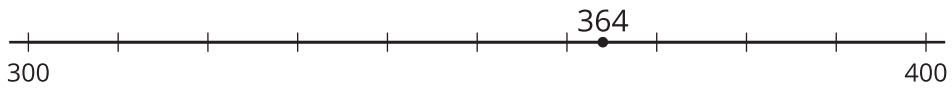
standard subtraction algorithm

$$\begin{array}{rrrr} & \overset{4}{\cancel{5}} & \overset{12}{\cancel{2}} & 8 \\ - & 2 & 7 & 1 \\ \hline \end{array}$$

As with addition, the standard algorithm for subtraction is not expected until grade 4. The work here focuses on making sense of the regrouping sometimes required when we subtract.

Section C: Round within 1,000

In this section, students learn to round whole numbers to the nearest ten or hundred, using number line diagrams in their reasoning. For example, they can see that for 364, the nearest ten (or multiple of 10) is 360, and the nearest hundred (or multiple of 100) is 400.



Section D: Solve Two-Step Problems

In this section, students apply their work with addition, subtraction, and multiplication to solve problems that require two steps, such as:

Mai had 104 beads. She bought two packs of beads and now she has 124 beads. How many beads were in each pack?

Try it at home!

Near the end of the unit, ask your student to find answers to the following problems using an algorithm of their choice:

- $293 + 592$
- $728 - 384$

Questions that may be helpful as they work:

- Can you explain the steps in your algorithm?
- Does your answer make sense? How do you know?
- Can you round your answer to the nearest multiple of 10? 100?

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Unit Assessments

Check Your Readiness A, B, C and D

End-of-Unit Assessment

Wrapping Up Addition and Subtraction Within 1,000: Section A Checkpoint

1. Find the value of each sum. Use an algorithm or strategy of your choice.

   a. $375 + 444$

   b. $138 + 283$

2. Here is how Han found the value of $684 + 237$.

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ \ } \\ 6\ 8\ 4 \\ +\ 2\ 3\ 7 \\ \hline 9\ 2\ 1 \end{array}$$

   a. What is the meaning of the two 1's above 684 in Han's calculation?

   b. Explain why Han's strategy accurately finds the value of 684 + 237.

Wrapping Up Addition and Subtraction Within 1,000: Section B Checkpoint

1. Find the value of each difference. Use an algorithm or strategy of your choice.

   a. $288 - 197$

   b. $506 - 388$

2. Here is how Elena found the value of $731 - 498$.

$$\begin{aligned} 498 + 2 &= 500 \\ 500 + 200 &= 700 \\ 700 + 30 &= 730 \\ 730 + 1 &= 731 \end{aligned}$$

$$200 + 30 + 2 + 1 = 233$$

   Explain why Elena's strategy accurately finds the value of $731 - 498$.

Wrapping Up Addition and Subtraction Within 1,000: Section C Checkpoint

1. a. What is 572 rounded to the nearest ten? What about to the nearest hundred?

   b. Is there a number that rounds to 300 to the nearest hundred and 240 to the nearest ten? Explain or show your reasoning.

2. a. What is the smallest number that rounds to 280 to the nearest ten? Explain or show your reasoning.

   b. What is the largest number that rounds to 280 to the nearest ten? Explain or show your reasoning.

3. Elena has 372 pennies in her piggy bank. Jada has 119 pennies in her piggy bank. Elena says that if they put their pennies together they have about 500.

   Do you agree with Elena's estimate? Explain or show your reasoning.

Wrapping Up Addition and Subtraction Within 1,000: Section D Checkpoint

1. There are 4 tables in the cafeteria with 9 students eating lunch at each table. There are also 177 students waiting in line for lunch at the cafeteria.

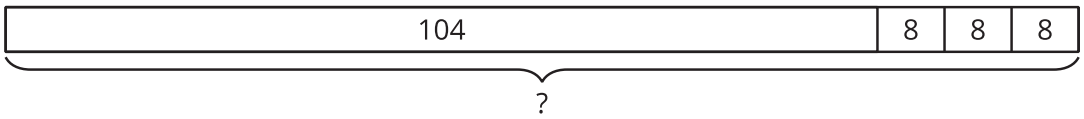
   How many students are there in the cafeteria altogether?

   a. Write an equation for the situation. Use a "?" for the unknown.

   b. Find how many students there are in the cafeteria altogether.

2. Andre has 104 collecting cards. He gets 3 more sets of 8 cards.

   a. Explain why the diagram represents the situation.



   b. Write an equation that matches the diagram.

   c. How many cards does Andre have now?

Wrapping Up Addition and Subtraction Within 1,000: End-of-Unit Assessment

1. Select **all** statements that are true about the numbers in the addition table.

+	1	2	3	4	5
1	2	3	4	5	6
2	3	4	5	6	7
3	4	5	6	7	8
4	5	6	7	8	9
5	6	7	8	9	10

A. There are the same number of odd and even numbers.

B. There are more even numbers than odd numbers.

C. There are more odd numbers than even numbers.

D. The number 7 appears 4 times in the table.

E. The number 15 does not appear in the table.

2. Find the value of each sum. Explain or show your reasoning.

a. $256 + 123$

b. $389 + 415$

3. Find the value of each difference. Explain or show your reasoning.

a. $568 - 347$

b. $541 - 228$

4. Find the value of each expression.

a. $135 + 644$

b. $644 - 135$

c. $537 - 299$

d. $537 + 299$

5. Select **all** true statements.

   A. 126 rounded to the nearest ten is 120.

   B. 126 rounded to the nearest hundred is 100.

   C. 849 rounded to the nearest hundred is 800.

   D. 849 rounded to the nearest hundred is 900.

   E. 35 rounded to the nearest hundred is 0.

6. There are 98 colored pencils in a bag. Five students each take 7 pencils from the bag. The number of pencils left in the bag is p.

   Which equation represents the situation?

   A. $98 - 7 = p$

   B. $98 + 5 \times 7 = p$

   C. $7 \times p = 98 - 5$

   D. $p = 98 - 5 \times 7$

7. There are seats for 500 students in the auditorium. There are 187 students from Clare's school and 229 students from Noah's school at the performance.

    a. Noah estimates that there will be about 100 empty seats. Do you agree with Noah? Explain or show your reasoning.

    b. Do you think there will be more or less than 100 empty seats? Explain or show your reasoning.

    c. How many empty seats will there be? Explain or show your reasoning.

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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

- Fluently add within 1,000 using algorithms based on place value and properties of operations.
- Use place value understanding to compose and decompose numbers.

Find the value of each sum. Use an algorithm or strategy of your choice.

a. $375 + 444$

b. $138 + 283$

Solution

a. 819. Sample response:

$$300 + 400 = 700$$
$$70 + 40 = 110$$
$$5 + 4 = 9$$
$$700 + 110 + 9 = 819$$

b. 421. Sample response:

$$\begin{array}{r} 1\ 3\ 8 \\ +\ 2\ 8\ 3 \\ \hline 1\ 1 \\ 1\ 1\ 0 \\ +\ 3\ 0\ 0 \\ \hline 4\ 2\ 1 \end{array}$$

Problem 2

Goals Assessed

- Fluently add within 1,000 using algorithms based on place value and properties of operations.
- Use place value understanding to compose and decompose numbers.

Here is how Han found the value of $684 + 237$.

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ \ } \\ 6\ 8\ 4 \\ +\ 2\ 3\ 7 \\ \hline 9\ 2\ 1 \end{array}$$

a. What is the meaning of the two 1's above 684 in Han's calculation?

b. Explain why Han's strategy accurately finds the value of 684 + 237.

Solution

a. The 1 above the 8 is a ten coming from $4 + 7$ which is a ten and a one. The 1 above the 6 is a hundred which comes when Han adds up the tens in the sum.

b. He adds the ones, tens, and hundreds of the two numbers and the two 1's help him add them all up correctly.

Assessment: Section B Checkpoint

Problem 1

Goals Assessed

- Fluently subtract within 1,000 using algorithms based on place value, properties of operations, and the relationship between addition and subtraction.

Find the value of each difference. Use an algorithm or strategy of your choice.

a. $288 - 197$

b. $506 - 388$

Solution

a. 91. Sample response:

$$\begin{array}{r} {\scriptstyle 1\ \ 18} \\ \cancel{2}\ \cancel{8}\ 8 \\ -\ \ 1\ 9\ 7 \\ \hline \ \ \ 9\ 1 \end{array}$$

b. 118. Sample response:

$$\begin{array}{r} {\scriptstyle 9} \\ {\scriptstyle 4\ \cancel{10}\ 16} \\ \cancel{5}\ \cancel{0}\ \cancel{6} \\ -\ \ 3\ 8\ 8 \\ \hline \ \ \ 1\ 1\ 8 \end{array}$$

Problem 2

Goals Assessed

- Fluently subtract within 1,000 using algorithms based on place value, properties of operations and the relationship between addition and subtraction.

Here is how Elena found the value of $731 - 498$.

$$\begin{aligned} 498 + 2 &= 500 \\ 500 + 200 &= 700 \\ 700 + 30 &= 730 \\ 730 + 1 &= 731 \end{aligned}$$

$$200 + 30 + 2 + 1 = 233$$

Explain why Elena's strategy accurately finds the value of $731 - 498$.

Solution

Elena finds how much she needs to add to 498 to get 731. This is the same as the difference $731 - 498$.

Assessment: Section C Checkpoint

Problem 1

Goals Assessed

- Round whole numbers to the nearest multiple of 10 and 100.

a. What is 572 rounded to the nearest ten? What about to the nearest hundred?
b. Is there a number that rounds to 300 to the nearest hundred and 240 to the nearest ten? Explain or show your reasoning.

Solution

a. 570 to the nearest ten and 600 to the nearest hundred.
b. No. A number that rounds to 300 to the nearest hundred is at least 250. This means that 250 is the smallest the number can be rounded to the nearest ten.

Problem 2

Goals Assessed

- Round whole numbers to the nearest multiple of 10 and 100.

a. What is the smallest number that rounds to 280 to the nearest ten? Explain or show your reasoning.
b. What is the largest number that rounds to 280 to the nearest ten? Explain or show your reasoning.

Solution

a. 275 because 274 is closer to 270 than 280 but 275 is halfway between 270 and 280 and we round it to 280
b. 284 because if I add 1 more then I get 285 which rounds to 290

Problem 3

Goals Assessed

- Assess the reasonableness of answers.

Elena has 372 pennies in her piggy bank. Jada has 119 pennies in her piggy bank. Elena says that if they put their pennies together they have about 500.

Do you agree with Elena's estimate? Explain or show your reasoning.

Solution

Sample responses:

- Yes. Elena has almost 400 pennies and Jada has a little more than 100 so together that's about 500.
- No. Elena is almost 30 pennies short of 400 and Jada only has about 20 pennies more than 100. Together they have less than 500 pennies.

Assessment: Section D Checkpoint

Problem 1

Goals Assessed

- Solve two-step word problems using addition, subtraction, and multiplication.

There are 4 tables in the cafeteria with 9 students eating lunch at each table. There are also 177 students waiting in line for lunch at the cafeteria.

How many students are there in the cafeteria altogether?

a. Write an equation for the situation. Use a "?" for the unknown.
b. Find how many students there are in the cafeteria altogether.

Solution

a. $177 + 4 \times 9 = ?$
b. 213. Sample reasoning: $4 \times 9 = 36$, $177 + 30 = 207$, $207 + 6 = 213$.

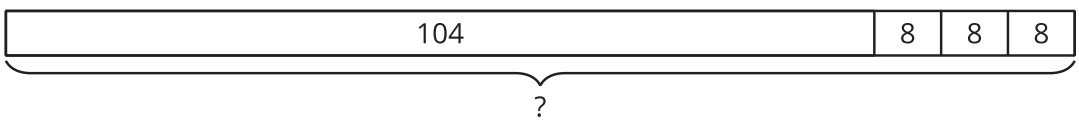
Problem 2

Goals Assessed

- Solve two-step word problems using addition, subtraction, and multiplication.

Andre has 104 collecting cards. He gets 3 more sets of 8 cards.

a. Explain why the diagram represents the situation.



b. Write an equation that matches the diagram.
c. How many cards does Andre have now?

Solution

a. The diagram shows Andre's 104 cards and then 3 groups of 8 cards more.

b. $104 + 3 \times 8 = ?$

c. 128, since $3 \times 8 = 24$ and $104 + 24 = 128$.

Assessment: End-of-Unit Assessment

Problem 1

Standards Alignments

Addressing 3.OA.D.9

Narrative

Students examine statements about the numbers in the addition table. They can look entry by entry at the table and evaluate each statement this way. This method will take time but will work with patience. For the problems about even and odd numbers, there are a few important observations students might make, beyond counting.

- There are 25 entries in the table so there cannot be the same number of even and odd numbers because 25 is odd.
- The numbers alternate between even and odd in both the rows and columns so this allows them to identify large parts of the table with the same number of even and odd numbers (for example in the addition table for 1 to 4 the number of even and odd numbers are equal).

The fact that 15 is not in the table should be familiar because the largest number is $5 + 5$ and the location of the 7's along the diagonal will also be familiar, or students can look for them and count them.

Select **all** statements that are true about the numbers in the addition table.

+	1	2	3	4	5
1	2	3	4	5	6
2	3	4	5	6	7
3	4	5	6	7	8
4	5	6	7	8	9
5	6	7	8	9	10

A. There are the same number of odd and even numbers.

B. There are more even numbers than odd numbers.

C. There are more odd numbers than even numbers.

D. The number 7 appears 4 times in the table.

E. The number 15 does not appear in the table.

Solution

["B", "D", "E"]

Problem 2

Standards Alignments

Addressing 3.NBT.A.2

Narrative

Students find sums with no approach suggested. The first sum can be found by adding each place value without regrouping while the second sum has regrouping for both ones and tens.

Find the value of each sum. Explain or show your reasoning.

a. $256 + 123$
b. $389 + 415$

Solution

a. 379. Sample response: Adding the hundreds gives $200 + 100 = 300$. Adding the tens gives $50 + 20 = 70$. Adding the ones gives $6 + 3 = 9$. Adding hundreds, tens, and ones gives 379.
b. 804. Sample response: Adding the hundreds gives $300 + 400 = 700$. Adding the tens gives $80 + 10 = 90$. Adding the ones gives $9 + 5 = 14$. Putting together tens and ones gives $90 + 14 = 104$ and then putting together with the hundreds gives $700 + 104 = 804$.

Problem 3

Standards Alignments

Addressing 3.NBT.A.2

Narrative

Students perform subtraction within 1,000 and explain their strategy with equations. The numbers for the first problem are chosen so that no decomposition is required to perform the operation. The numbers for the second problem require decomposition of a ten if students subtract by place

value. Students have a variety of ways to show their work including representing the numbers in expanded form or decomposing the numbers by place value to perform subtraction without writing the numbers out in expanded form. Students may also use equations and add on to find the difference. This method works well for the second problem.

Find the value of each difference. Explain or show your reasoning.

a. $568 - 347$
b. $541 - 228$

Solution

a. 221. Sample response:

$$500 - 300 = 200$$
$$60 - 40 = 20$$
$$8 - 7 = 1$$
$$200 + 20 + 1 = 221$$

b. 313. Sample response:

$$228 + 300 = 528$$
$$528 + 10 = 538$$
$$538 + 3 = 541$$
$$300 + 10 + 3 = 313$$

Problem 4

Standards Alignments

Addressing 3.NBT.A.2

Narrative

Students find the sums and differences within 1,000 with no reasoning required. This item assesses fluency. The first difference requires only one decomposition when subtracting by place value. The last two problems suggest a mental or written compensation strategy. If students use a compensation strategy but choose the wrong operation to compensate their answer will be off by 2 (236 and 838).

Find the value of each expression.

a. $135 + 644$
b. $644 - 135$
c. $537 - 299$

d. $537 + 299$

Solution

a. 779
b. 509
c. 238
d. 836

Problem 5

Standards Alignments

Addressing 3.NBT.A.1

Narrative

Students round numbers to the nearest ten and hundred. The numbers are not plotted on number lines though students may sketch number lines as a scaffold. Students may select A if they just remove or ignore the ones. This reasoning will also lead to selecting E. Students may fail to select D if they first round to the nearest ten, getting 850, and then round to the nearest hundred.

Select **all** true statements.

A. 126 rounded to the nearest ten is 120.
B. 126 rounded to the nearest hundred is 100.
C. 849 rounded to the nearest hundred is 800.
D. 849 rounded to the nearest hundred is 900.
E. 35 rounded to the nearest hundred is 0.

Solution

["B", "C", "E"]

Problem 6

Standards Alignments

Addressing 3.OA.D.8

Narrative

Students select equations that represent the solution to a two-step problem. Students may select A if they do not pay attention to the fact that there are 5 students who each take 7 pencils from the bag. Students may select B if they choose the wrong operation to apply to 98 and the expression 5×7. Choice C represents a situation where the pencils are divided into 7 equal groups after taking away 5 of the pencils so if students select this option then they need more work interpreting equations in context.

There are 98 colored pencils in a bag. Five students each take 7 pencils from the bag. The number of pencils left in the bag is p.

Which equation represents the situation?

A. $98 - 7 = p$

B. $98 + 5 \times 7 = p$

C. $7 \times p = 98 - 5$

D. $p = 98 - 5 \times 7$

Solution

D

Problem 7

Standards Alignments

Addressing 3.OA.D.8

Narrative

Students estimate a sum and difference and then calculate both. Different responses for the first question are possible and the reasoning behind the agreement or disagreement with the estimate is the important part of this question. The estimates in the first two questions help check student work on the two-step third question. If students make a calculation error in this problem and

notice the discrepancy between the answer and the estimate, they have an opportunity to check and correct their work.

There are seats for 500 students in the auditorium. There are 187 students from Clare's school and 229 students from Noah's school at the performance.

a. Noah estimates that there will be about 100 empty seats. Do you agree with Noah? Explain or show your reasoning.
b. Do you think there will be more or less than 100 empty seats? Explain or show your reasoning.
c. How many empty seats will there be? Explain or show your reasoning.

Solution

a. Yes or no is an acceptable response depending on the explanation provided. Sample responses:
   - Yes, 187 is close to 200 and 229 is close to 200, so that would be 400 students. That would leave 100 empty seats.
   - No, 187 is close to 190 and 229 is close to 230. Since $190 + 230$ is a lot more than 400, there are fewer than 100 seats left.
b. Less, because 229 is 29 more than 200 and 187 is really close to 200.
c. There are 84 empty seats. Sample response:

$200 + 100 = 300$
$80 + 20 = 100$
$9 + 7 = 16$
$300 + 100 + 16 = 416$

To find $500 - 416$, I added on:
$416 + 80 = 496$
$496 + 4 = 500$
$80 + 4 = 84$

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Lesson Cool Downs

Lesson 1: Represent Numbers in Different Ways

Cool Down: Let Me Count the Ways

Select **all** the ways you could represent two hundred fifty-seven.

A. 572

B. 257

C. $200 + 50 + 7$

D. $20 + 500 + 7$

E. $200 + 40 + 17$

F. $100 + 140 + 7$

Lesson 2: Addition and Subtraction Situations

Cool Down: How Much Taller?

The Statue of Liberty is 305 feet tall. The Brooklyn Bridge is 133 feet tall.

How much taller is the Statue of Liberty than the Brooklyn Bridge? Explain or show your reasoning.

Lesson 3: Add Your Way

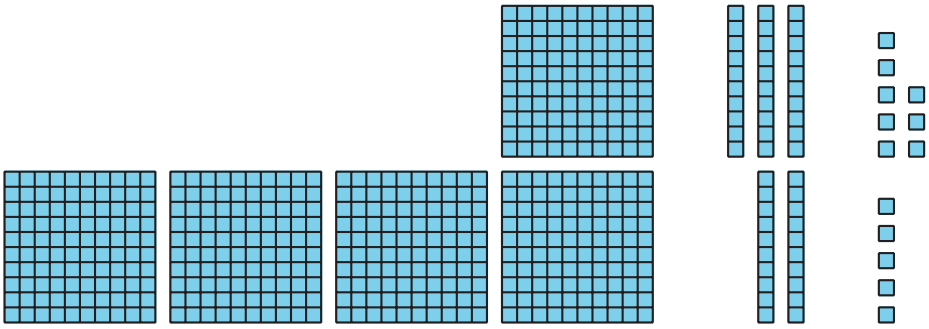
Cool Down: Add It Up

Find the value of $258 + 217$. Explain or show your reasoning.

Lesson 4: Introduction to Addition Algorithms

Cool Down: Choose an Algorithm

A diagram of the base-ten blocks that represent $138 + 425$ is shown.



Use an algorithm you learned in today's lesson to find the value of the sum.

Lesson 5: Another Addition Algorithm

Cool Down: Use an Algorithm for Addition

Use an algorithm of your choice to find the value of $365 + 182$.

Lesson 6: Use Strategies and Algorithms to Add

Cool Down: Algorithm or Another Strategy?

Would you use an algorithm or another strategy to find the value of $299 + 179$?

Explain your reasoning.

Lesson 7: Subtract Your Way

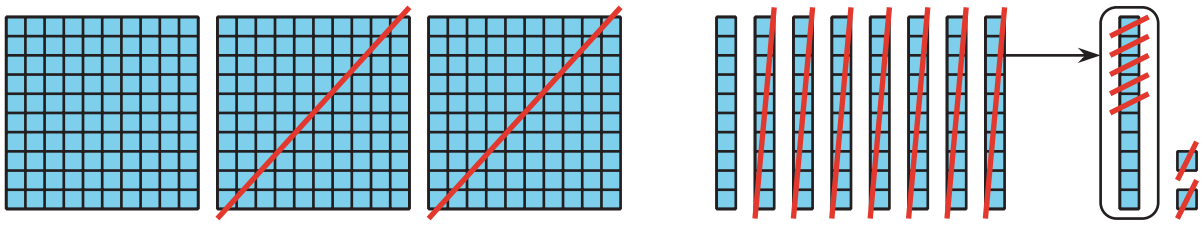
Cool Down: Subtract within 1,000

Find the value of $372 - 158$. Explain or show your reasoning.

Lesson 8: Subtraction Algorithms (Part 1)

Cool Down: Connect a Diagram and an Algorithm

Explain how the diagram matches the algorithm.

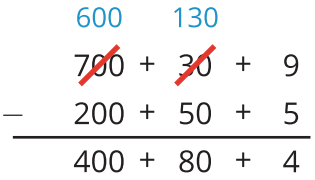


$$\begin{array}{rrcrcr} & & & 70 & & 12 \\ & 300 & + & \cancel{80} & + & \cancel{2} \\ - & 200 & + & 60 & + & 7 \\ \hline & 100 & + & 10 & + & 5 \end{array}$$

Lesson 9: Subtraction Algorithms (Part 2)

Cool Down: How Did Andre Subtract?

Andre found the value of $739 - 255$. His work is shown.



Explain how he subtracted and the value he found for $739 - 255$.

Lesson 10: Subtraction Algorithms (Part 3)

Cool Down: Choose the Method

Use an algorithm of your choice to find the value of $419 - 267$.

Lesson 11: Analyze Subtraction Algorithms

Cool Down: Subtraction Reflection

You've learned many ways to subtract large numbers, including strategies and algorithms.

1. What is your favorite way to subtract large numbers?

2. What's a way that you would like to learn more about and use more?

Lesson 12: Subtract Strategically

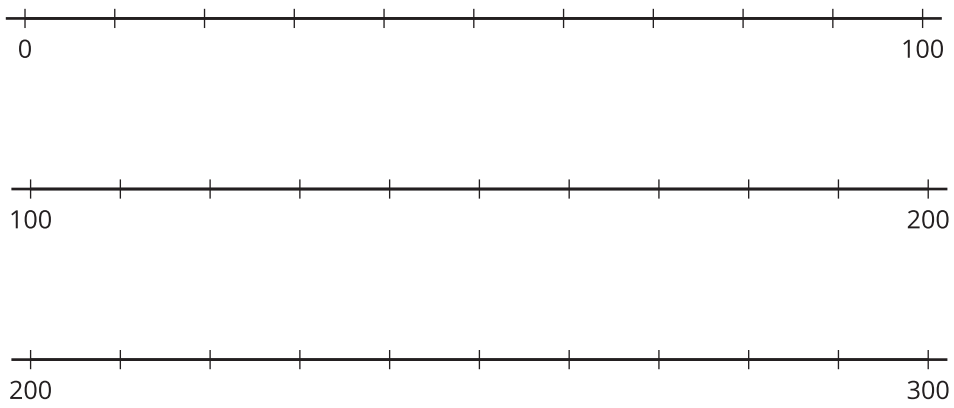
Cool Down: An Algorithm or Another Strategy?

How would you find the value of $700 - 599$? Explain your reasoning.

Lesson 13: Multiples of 100

Cool Down: Locate, Label, and Name

1. Locate and label 185 on the number line on which it belongs.



2. Name the closest multiple of 100 to 185.

Lesson 14: Nearest Multiples of 10 and 100

Cool Down: Closest Multiple of 10 and 100

1. What is the nearest multiple of 100 to 162? Is it 100 or 200? Explain or show your reasoning.

2. What is the nearest multiple of 10 to 162? Is it 160 or 170? Explain or show your reasoning.

Lesson 15: Round to the Nearest Ten and Hundred

Cool Down: Round It Twice

1. Round 237 to the nearest ten. Show or explain your reasoning.

2. Round 237 to the nearest hundred. Show or explain your reasoning.

Lesson 16: Round and Round Again

Cool Down: What is Clare’s Mystery Number?

Clare says she’s thinking of a mystery number and gives these three clues:

- The number is even.
- The number rounded to the nearest ten is 270.
- The number is between 260 and 280.

What are 2 numbers that could be Clare's mystery number?

Lesson 17: Does It Make Sense?

Cool Down: Beads in the Bin

In the bin there are 124 beads. Ninety-six more beads are dumped in the bin. Then 53 beads are used to make a bracelet.

Tyler says there are 273 beads in the bin now.

Explain why Tyler's statement doesn't make sense.

Lesson 18: Diagrams and Equations for Word Problems

Cool Down: Equation Match

Andre had 451 beads. 125 beads were blue. 223 beads were pink. The rest of the beads were yellow. How many beads were yellow?

Which equation matches this situation? Explain your reasoning.

A. $451 + 125 + 223 = ?$

B. $? + 125 + 223 = 451$

C. $? = 451 + 125 - 223$

Lesson 19: Situations and Equations

Cool Down: How Many Beads?

Andre has 196 beads. He uses 48 beads to make a craft. Then he gives 30 beads to a friend. How many beads does Andre have left?

1. Write an equation with a letter for the unknown quantity to represent this situation.

2. Solve the problem. Explain or show your reasoning.

Lesson 20: More Practice to Represent and Solve

Cool Down: Reflection

Describe something you really understand well after today's lesson or describe something that was confusing or challenging.

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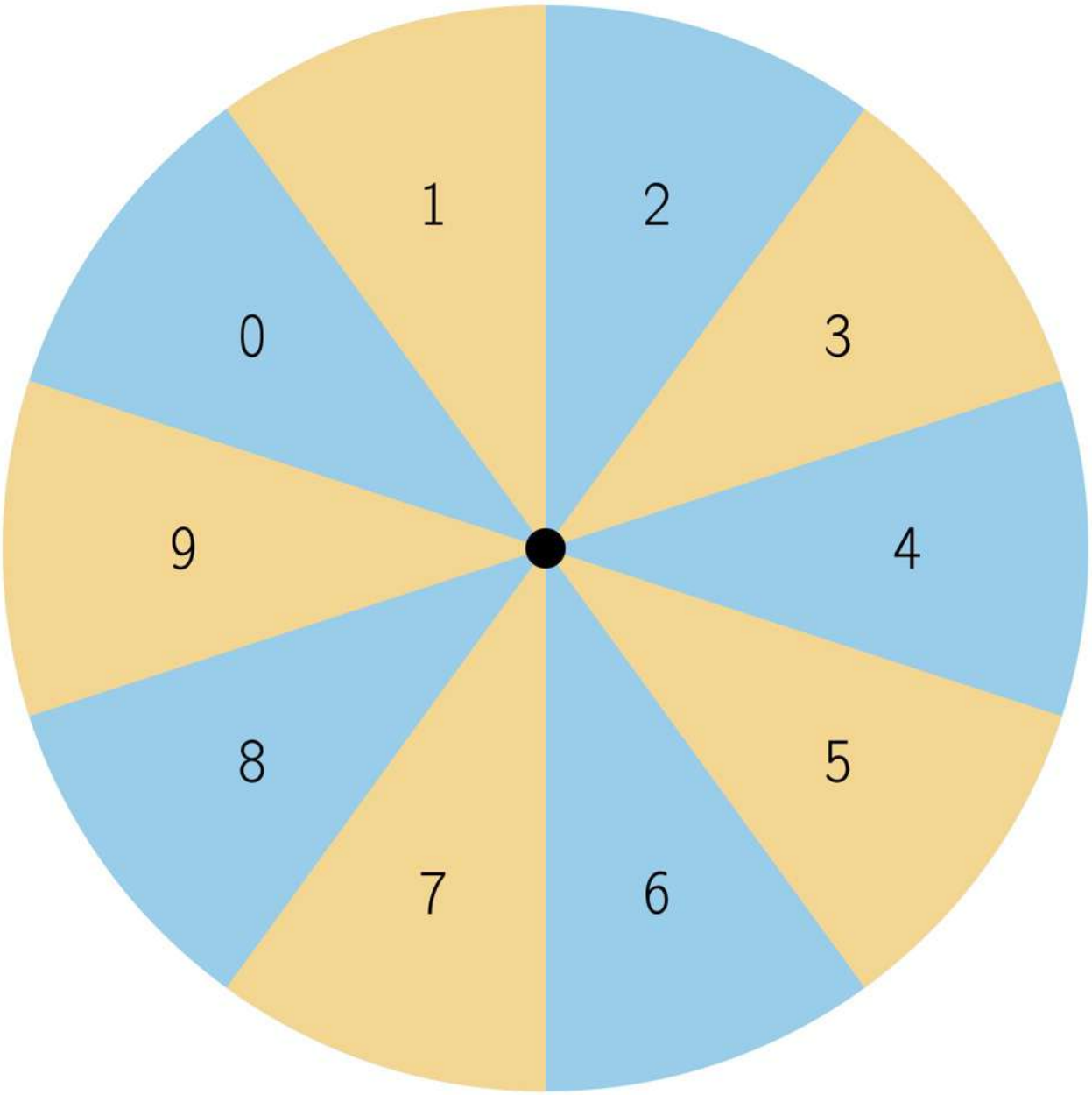
Instructional Masters

Instructional Masters for Wrapping Up Addition and Subtraction Within 1,000

address	title	students per copy	written on?	requires cutting?	card stock recommended?	color paper recommended?
Activity Grade3.3.12.2	Greatest Difference, Smallest Difference	2	no	no	no	no
Activity Grade3.3.1.2	Numbers in Different Forms Round Table	1	yes	no	no	no
Activity Grade3.3.8.2	Diagrams and Algorithms	2	no	yes	no	no
Activity Grade3.3.1.1	Card Sort: Numbers in Their Different Forms	2	no	yes	no	no
Activity Grade3.3.18.1	Card Sort: Situations, Equations, and Diagrams	4	no	yes	no	no
Activity Grade3.3.20.2	Info Gap: Bake Sale	2	no	yes	no	no
Center	Target Numbers Stage 6 Recording Sheet	1	yes	no	no	no
Center	Five in a Row Addition and Subtraction Stage 8 Gameboard	2	no	no	no	no
Center	Rectangle Rumble Stage 2 Grid	2	yes	no	no	no
Center	Rectangle Rumble Stage 2 Spinner	2	no	no	no	no
Center	How Close? Stage 4 Recording Sheet	1	yes	no	no	no
Center	Number Cards (0-10)	2	no	yes	yes	no

Center	Number Puzzles Addition and Subtraction Stage 5 Recording Sheet	2	yes	no	no	no
Center	Five in a Row Multiplication and Division Stage 2 Gameboard	2	no	no	no	no
Center	Target Numbers Stage 7 Recording Sheet	1	yes	no	no	no
Center	Capture Squares Stage 6 Gameboard	2	yes	no	no	no
Center	Capture Squares Stage 6 Spinner	2	no	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

Greatest Difference, Smallest Difference



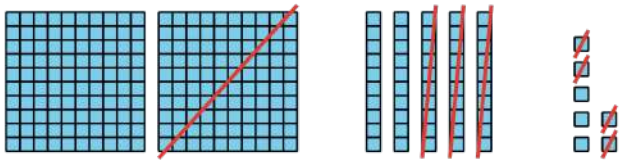
Numbers in Different Forms Round Table

Box 1: Three-digit Number	Box 2:
Box 3:	Box 4:

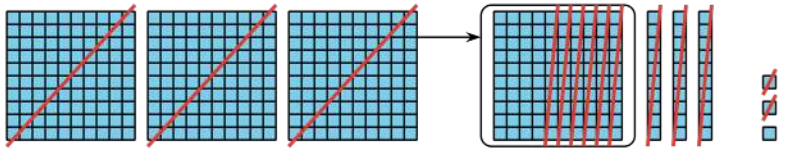
Diagrams and Algorithms
A

$$\begin{array}{rrcrcr} & & 60 & & 13 \\ & 300 & + & \cancel{70} & + & \cancel{3} \\ - & 200 & + & 30 & + & 6 \\ \hline & 100 & + & 30 & + & 7 \end{array}$$

Diagrams and Algorithms
B



Diagrams and Algorithms
E



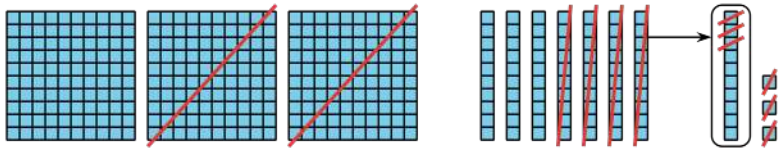
Diagrams and Algorithms
F

$$\begin{array}{rrcrcr} & & 200 & & 120 \\ & \cancel{300} & + & \cancel{20} & + & 7 \\ - & 100 & + & 80 & + & 5 \\ \hline & 100 & + & 40 & + & 2 \end{array}$$

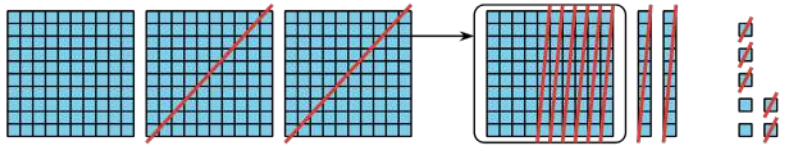
Diagrams and Algorithms
C

$$\begin{array}{rrrrrr} & 200 & + & 50 & + & 7 \\ - & 100 & + & 30 & + & 4 \\ \hline & 100 & + & 20 & + & 3 \end{array}$$

Diagrams and Algorithms
G



Diagrams and Algorithms
D



Diagrams and Algorithms
H

$$\begin{array}{rrrrrr} & \overset{200}{\not{3}00} & + & \overset{130}{\not{3}0} & + & 3 \\ - & 200 & + & 90 & + & 2 \\ \hline & 0 & + & 40 & + & 1 \end{array}$$

Card Sort: Numbers in Their Different Forms

Card Sort: Numbers in Their Different Forms
A

175

Card Sort: Numbers in Their Different Forms
E

three hundred twenty-nine

Card Sort: Numbers in Their Different Forms
I

299

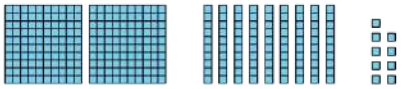
Card Sort: Numbers in Their Different Forms
B

$800 + 10 + 3$

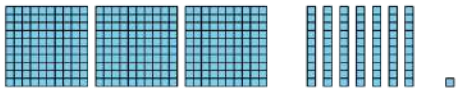
Card Sort: Numbers in Their Different Forms
F

371

Card Sort: Numbers in Their Different Forms
J



Card Sort: Numbers in Their Different Forms
C



Card Sort: Numbers in Their Different Forms
G

one hundred seventy-five

Card Sort: Numbers in Their Different Forms
K

329

Card Sort: Numbers in Their Different Forms
D

two hundred ninety-nine

Card Sort: Numbers in Their Different Forms
H

813

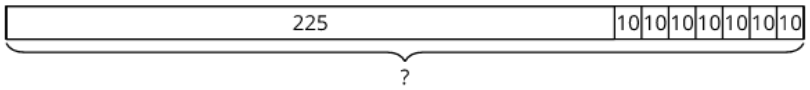
Card Sort: Numbers in Their Different Forms
L

$100 + 60 + 15$

Card Sort: Situations, Equations, and Diagrams
A

Clare had 225 beads. A friend gave her a pack of 48 beads. Then she used 70 beads to make a necklace. How many beads does Clare have now?

Card Sort: Situations, Equations, and Diagrams
B



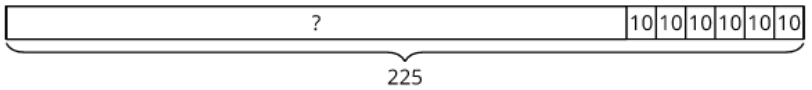
Card Sort: Situations, Equations, and Diagrams
C

$$225 - (6 \times 10) = ?$$

Card Sort: Situations, Equations, and Diagrams
G

Andre has 225 crayons. He buys 6 more packs and each pack has 10 crayons. How many crayons does Andre have now?

Card Sort: Situations, Equations, and Diagrams
H



Card Sort: Situations, Equations, and Diagrams
I

Diego has a collection of 225 baseball cards. He gets 35 more cards from a friend, then buys 72 cards. How many cards does Diego have now?

Card Sort: Situations, Equations, and Diagrams
D

Elena has 7 notebooks. Each notebook has 10 paperclips in it. Elena also has a box of 225 paperclips. How many paperclips does Elena have?

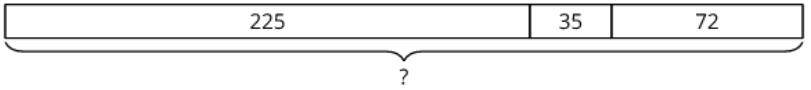
Card Sort: Situations, Equations, and Diagrams
J

Han has 225 beads. Then he makes 6 bracelets for his friends. Each bracelet has 10 beads. How many beads does Han have now?

Card Sort: Situations, Equations, and Diagrams
E

$$225 + (6 \times 10) = ?$$

Card Sort: Situations, Equations, and Diagrams
K



Card Sort: Situations, Equations, and Diagrams

F

$$? = 225 + 48 - 70$$

Card Sort: Situations, Equations, and Diagrams

L

$$? = (7 \times 10) + 225$$

Info Gap: Bake Sale

Problem Card 1

Clare is helping coordinate the school bake sale. They already have some money in the cash box. Then, a customer buys some brownies.

How much money is in the cash box now?

Info Gap: Bake Sale

Data Card 1

- There is $175 in the cash box to start.
- The customer bought 6 brownies.
- The brownies cost $3 each.

Info Gap: Bake Sale

Problem Card 2

At the bake sale, there were a lot of items for sale when they started. Cookies are the most popular purchase. Some packs of cookies sold right away.

How many items are left to purchase?

Info Gap: Bake Sale

Data Card 2

- They had 230 items to sell when they started.
- Seven packs of cookies were sold.
- Each pack had 10 cookies in it.

Target Numbers Stage 6 Recording Sheet

Directions:

- Roll 3 number cubes to get a starting number for both partners.
- On your turn:
  - Roll 3 number cubes. For each cube, decide whether it represents hundreds, tens or ones that you will add to your starting number.
  - Write an equation to represent the sum.
- Take turns until you've played 6 rounds.
- Each round, the sum from the previous equation is the starting number in the new equation.
- The partner to get a sum closest to 1,000 without going over wins.

roll and choose	equation
_____ hundreds **_____ tens** **_____ ones**	_____ + _____ = _____
_____ hundreds **_____ tens** **_____ ones**	_____ + _____ = _____
_____ hundreds **_____ tens** **_____ ones**	_____ + _____ = _____
_____ hundreds **_____ tens** **_____ ones**	_____ + _____ = _____
_____ hundreds **_____ tens** **_____ ones**	_____ + _____ = _____
_____ hundreds **_____ tens** **_____ ones**	_____ + _____ = _____

Five in a Row Addition and Subtraction Stage 8 Gameboard

Directions:

- Partner A: Put a paper clip on 2 numbers in the grey rows. Cover the sum of the 2 numbers with a counter.
- Partner B: Move 1 of the paper clips, add the numbers, and cover the sum with a counter.
- Take turns. The first partner to cover 5 squares in a row wins.

918	935	335	401	313
446	407	585	929	709
352	613	440	591	754
715	748	630	896	429
346	890	737	307	624

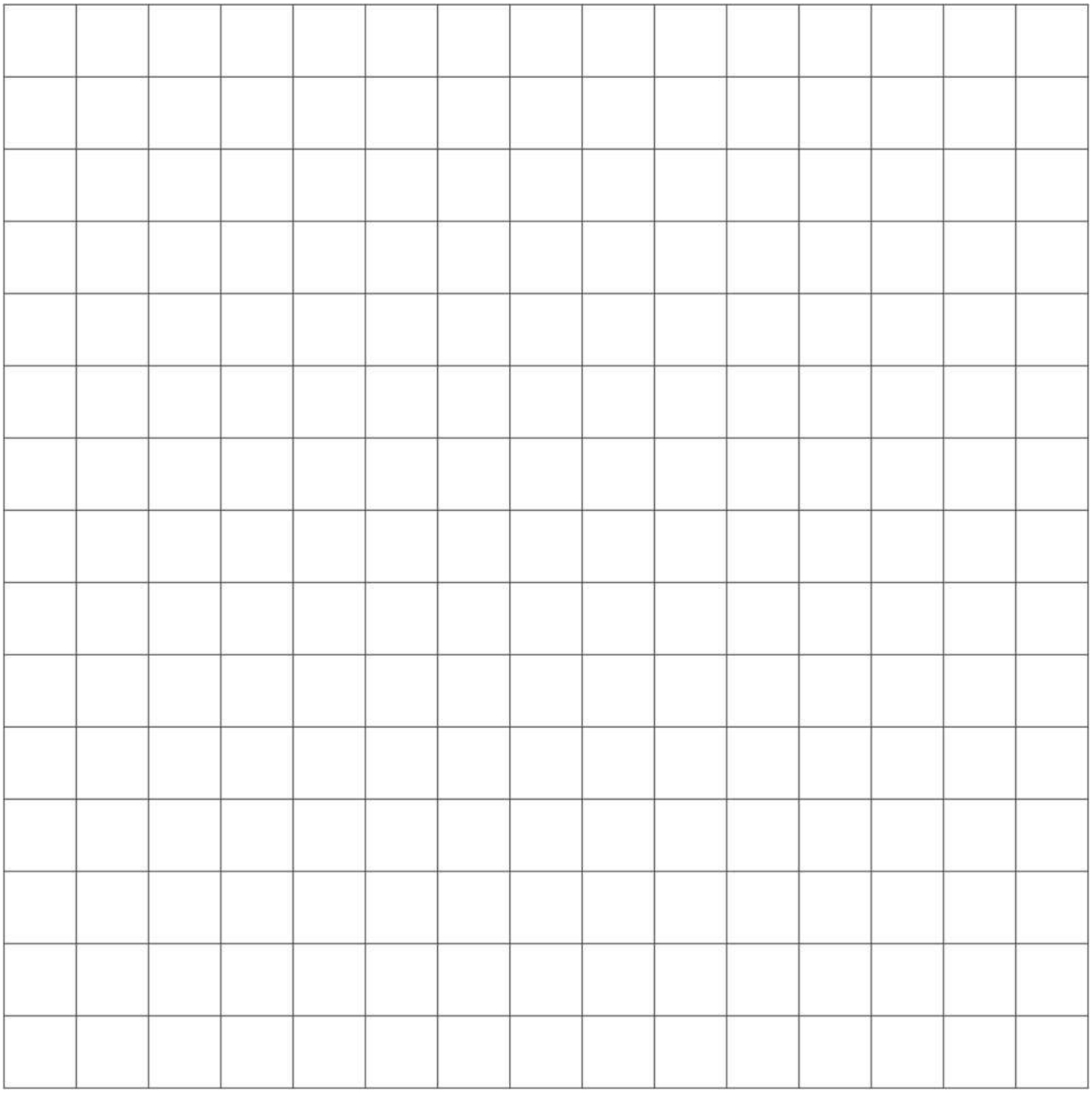
45	67	78	84	39

670	362	851	546	268

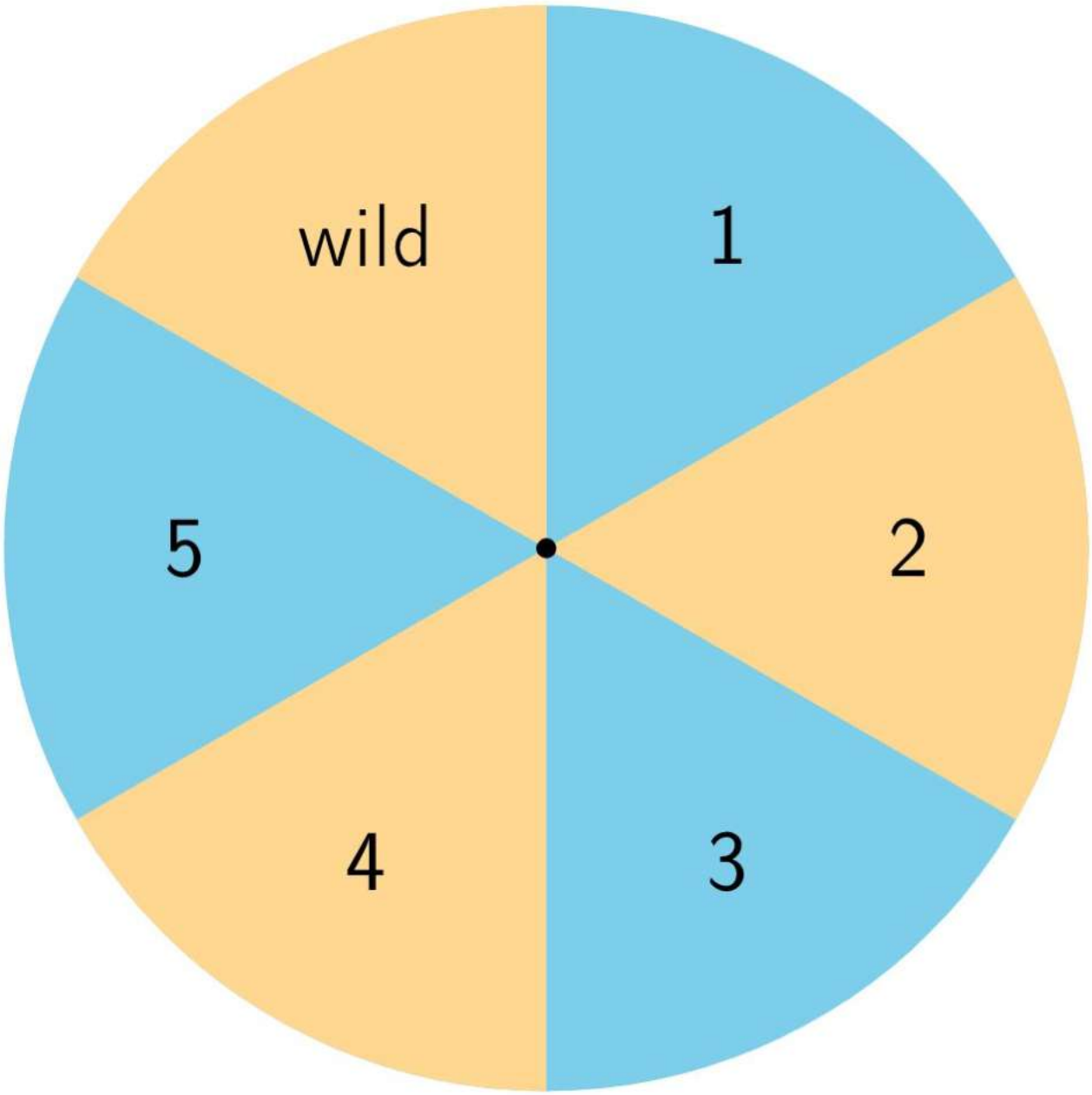
Rectangle Rumble Stage 2 Grid

Directions:

- Choose a color for your rectangles different from your partner.
- On your turn:
  - Spin the spinner and roll the number cube.
  - Shade in a rectangular area to represent the product of the two numbers.
- Take turns until the grid can't fit any more rectangles.
- Each partner adds up their total area, the partner with the greatest total square units wins.



Rectangle Rumble Stage 2 Spinner



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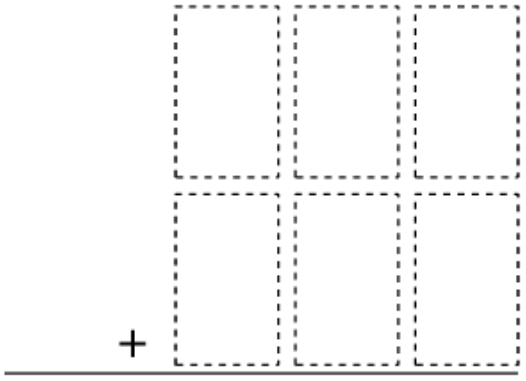
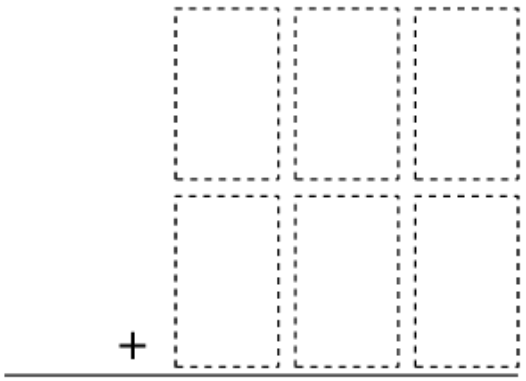
How Close? Stage 4 Recording Sheet

Directions:

- Each partner:
  - Take 8 cards.
  - Choose 6 cards to make 2 three-digit numbers.
  - Write an equation to show the sum of the numbers you made.
  - Your score for each round is the difference between your sum and 1,000.
- Take 6 new cards and start the next round.
- At the end of the game, add your score for each round. The player with the lowest score wins.

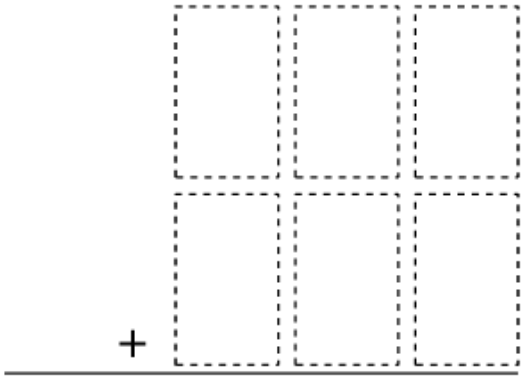


Your score this round:_____

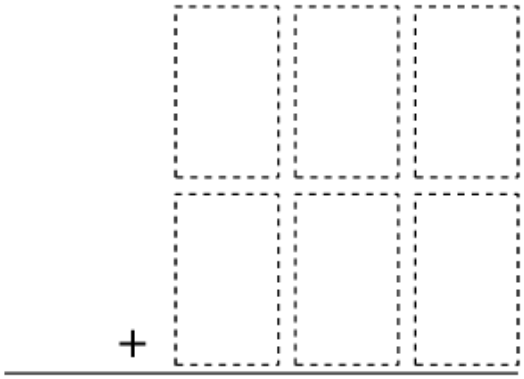


Your score this round:_____

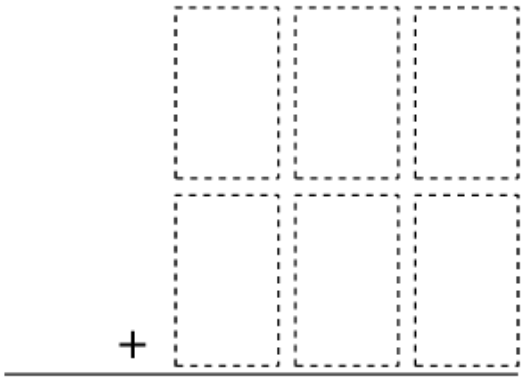
How Close? Stage 4 Recording Sheet



Your score this round:_____



Your score this round:_____



Your score this round:_____

Number Cards (0-10)

1	2
3	4
5	6

Number Cards (0-10)

7	8
9	1
2	3

Number Cards (0-10)

4	5
6	7
8	9

Number Cards (0-10)

0	0
10	10

Number Puzzles Addition and Subtraction Stage 5 Recording Sheet

Puzzle 1

Fill in digits to make each equation true.

You may only use each digit (0–9) once.

$\square\,\boxed{5}\,\boxed{0} + \square\,\boxed{5}\,\boxed{0} = 700$
$\boxed{8}\,\square\,\boxed{2} - \square\,\boxed{2}\,\boxed{1} = 371$
$\square\,\boxed{2}\,\boxed{9} + \boxed{1}\,\boxed{2}\,\square = 456$
$\square\,\boxed{0}\,\boxed{0} - \boxed{1}\,\boxed{5}\,\square = 442$
$\boxed{3}\,\boxed{5}\,\square - \boxed{1}\,\boxed{0}\,\square = 251$

Puzzle 2

Fill in digits to make each equation true.
You may only use each digit (0–9) once.

$150 + \square\ \boxed{0}\ \square = 759$
$\square\ \boxed{0}\ \boxed{0} - 187 = \boxed{5}\ \boxed{1}\ \square$
$\boxed{5}\ \boxed{2}\ \square + \boxed{1}\ \boxed{4}\ \square = 668$
$\boxed{6}\ \square\ \square - 531 = 111$
$\boxed{4}\ \square\ \square + 322 = 773$

Number Puzzles Addition and Subtraction Stage 5 Recording Sheet

Puzzle 3

Fill in digits to make each equation true.
You may only use each digit (0–9) once.

$\square\,\boxed{4}\,\boxed{0} + \square\,\boxed{6}\,\boxed{0} = 800$
$\square\,\boxed{0}\,\boxed{0} - \square\,\boxed{5}\,\boxed{5} = 545$
$351 + \boxed{4}\,\square\,\square = 818$
$541 - \boxed{2}\,\square\,\square = 257$
$785 - 682 = \square\,\square\,\boxed{3}$

Puzzle 4

Fill in digits to make each equation true.
You may only use each digit (0–9) once.

$\square\,0\,5 + 1\,\square\,7 = 912$
$\square\,0\,0 - 271 = 3\,\square\,9$
$\square\,2\,8 + \square\,5\,6 = 484$
$\square\,0\,5 - 100 = 6\,0\,\square$
$2\,\square\,3 + 3\,\square\,2 = 635$

Five in a Row Multiplication and Division Stage 2 Gameboard

Directions:

- Partner A:
  - Put a paper clip on 2 numbers in the grey rows.
  - Multiply the numbers.
  - Cover the product of the 2 numbers with a counter.
- Partner B:
  - Move 1 of the paper clips, multiply the numbers, and cover the product with a counter.
- Take turns. The first partner to cover 5 squares in a row wins.

1	2	3	4	5	6
7	8	9	10	12	14
15	16	18	20	21	24
25	27	28	30	32	35
36	40	42	45	48	49
54	56	63	64	72	81

1	2	3	4	5

6	7	8	9

Target Numbers Stage 7 Recording Sheet

Directions:

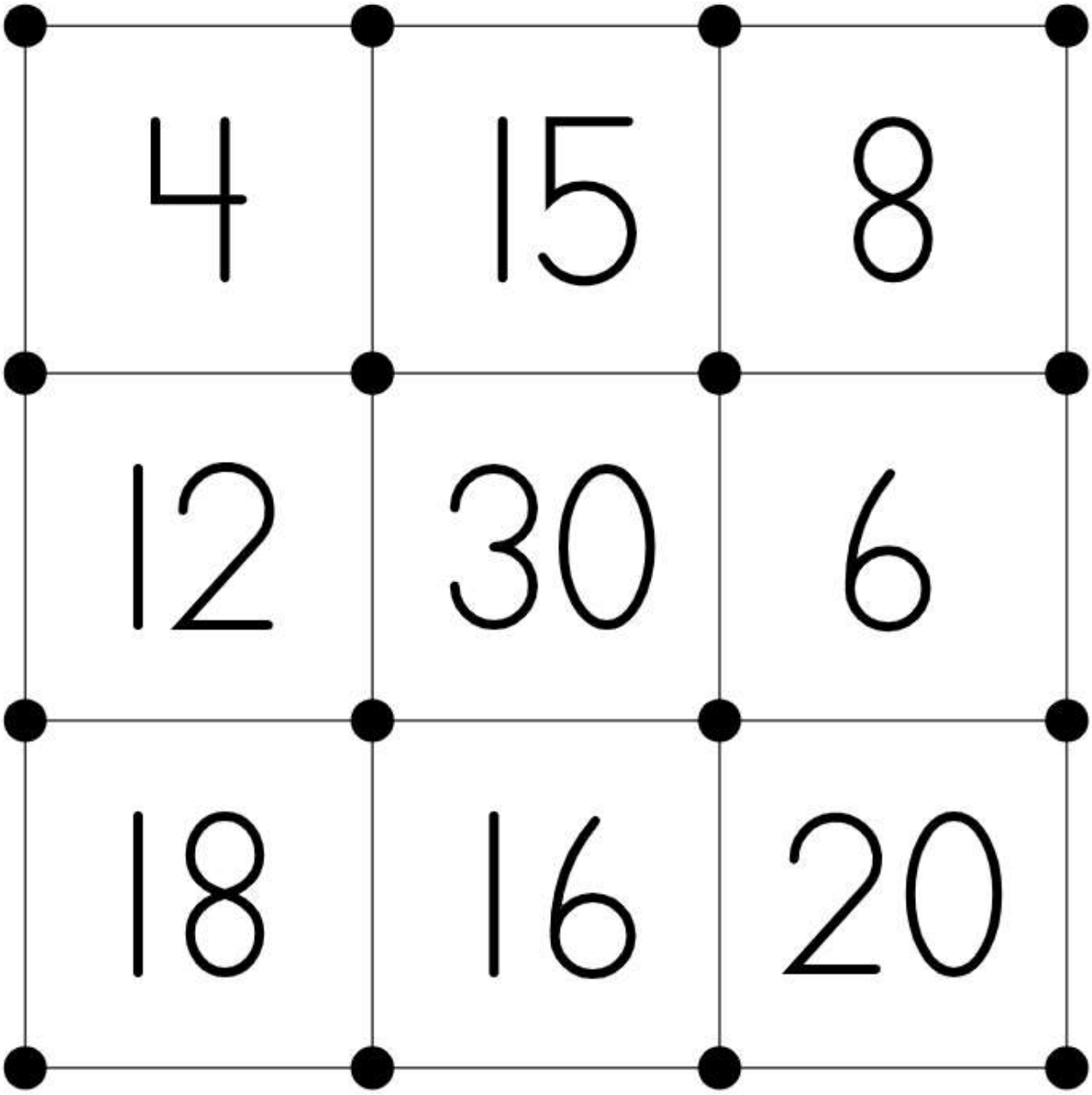
- On your turn:
  - Start at 1,000. Roll 3 number cubes. For each cube, decide whether the number you rolled will represent hundreds, tens, or ones. Write an equation to represent the difference.
- Take turns until you've played 6 rounds.
- Each round, the difference from the previous equation is the starting number in the new equation.
- The partner who gets a difference closest to 0 without going below 0 wins.

roll and choose	equation
_____ hundreds **_____ tens** **_____ ones**	1,000 − _____ = _____
_____ hundreds **_____ tens** **_____ ones**	_____ − _____ = _____
_____ hundreds **_____ tens** **_____ ones**	_____ − _____ = _____
_____ hundreds **_____ tens** **_____ ones**	_____ − _____ = _____
_____ hundreds **_____ tens** **_____ ones**	_____ − _____ = _____
_____ hundreds **_____ tens** **_____ ones**	_____ − _____ = _____

Capture Squares Stage 6 Gameboard

Directions:

- On your turn:
  - Roll the number cube and spin the spinner. Find the product.
  - Choose a square on the gameboard that shows that number. Draw one line connecting any 2 dots around the number.
  - If you can't draw a line, roll and spin again.
  - If you draw a line that finishes a square around a number, shade in that box with your color.
- Take turns with your partner. The first player to shade in 3 boxes wins.



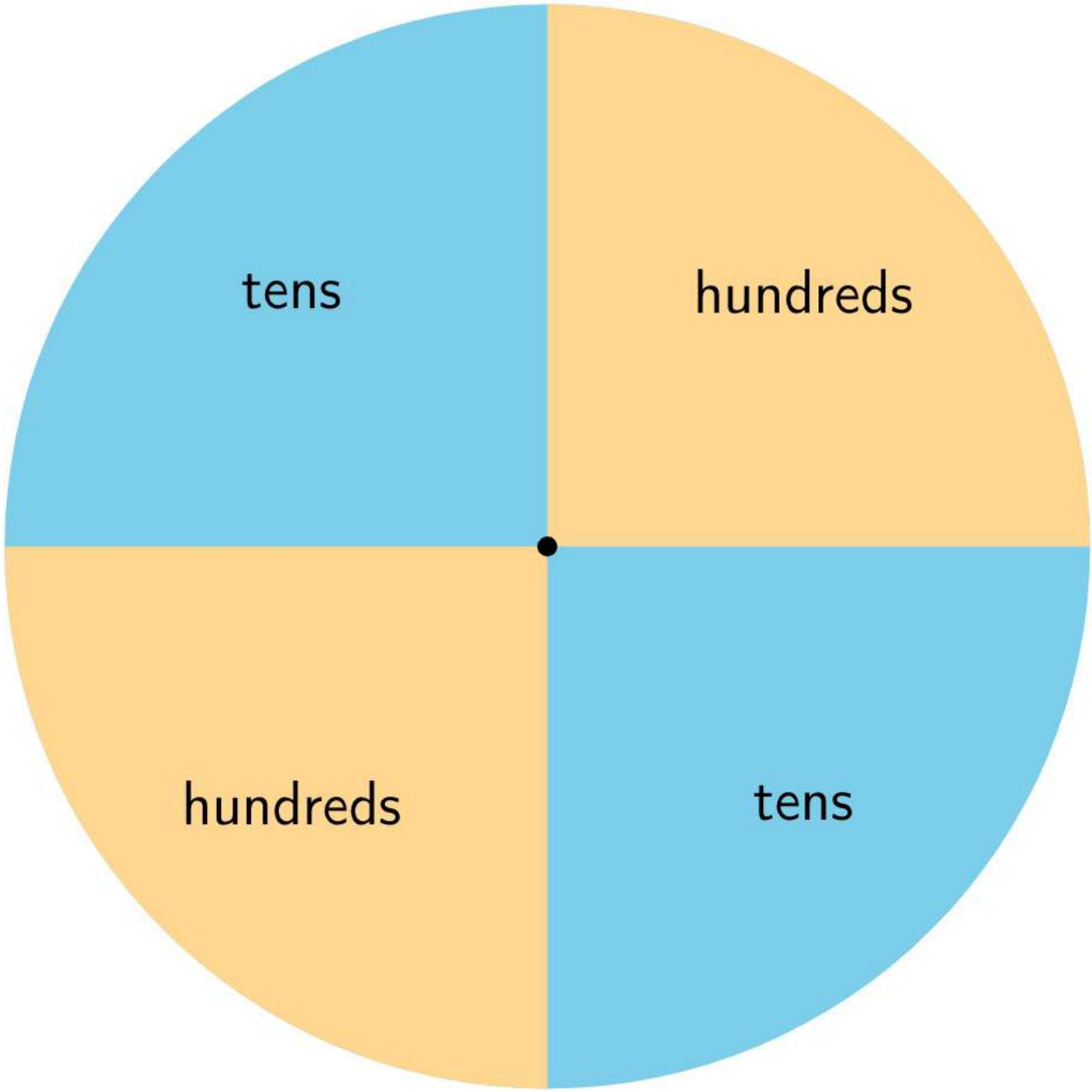
Capture Squares Stage 6 Spinner

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.

Tic Tac Round Stage 1 Spinner



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