Grade 4 – Unit 4 – Module 2
Teachers Guide Sample

bridges®
in mathematics

Module 2
The Standard Subtraction Algorithm

Print Originals
Pages renumber with each module.

Student Book Pages
Page numbers correspond to those in the Bridges Student Books.

Home Connections Pages
Page numbers correspond to those in the Home Connections books.

Module 2
The Standard Subtraction Algorithm

Overview

Students build on what they learned about addition in Module 1 as the focus shifts to subtraction. Number strings and problem situations help students deepen their understanding of subtraction strategies, including find the difference, take away, and constant difference. Students learn the standard algorithm for subtraction and compare it to other strategies they have explored. They learn one new Work Place in the module: Roll & Subtract 1,000. The teacher collects a work sample in Session 4 that provides information about students' understanding of and proficiency with strategies for solving multidigit subtraction problems. Students will also show what they have learned in Module 2 with a brief checkpoint assessment at the beginning of the next module.

Sessions	P&I	NS	MF	WP	A	HC
Session 1 Take Away or Find the Difference This session begins with a review of two subtraction strategies taught in December Number Corner. Students use these strategies with greater numbers and discuss when it is best to use each. Students then spend the remainder of the session working on a set of rhbbelated problems. At the end of the session, the teacher assigns the Think Before You Add Home Connection.	●	●				●
Session 2 Constant Difference This session begins with a hands-on experience that helps students apply the constant difference strategy they learned in third grade and in December Number Corner to greater numbers. Students summarize how they can use the strategy to subtract before spending the remaining time at Work Places.	●			●		
Session 3 The Standard Algorithm for Multidigit Subtraction After a warm-up related to regrouping, students work in pairs to represent and solve a subtraction problem situation using base ten number pieces and then share their strategies. The class works together to solve two problems, representing and recording them using the standard algorithm for subtraction. Then students solve a group of problems using any strategy in preparation for the math forum during the next session. At the end of the session, the teacher assigns the Number Cards Home Connection.	●					●
Session 4 Subtraction Strategies Math Forum Students participate in a math forum and discuss which numbers in multidigit subtraction problems lend themselves to particular strategies. Then they spend the rest of the session working independently on subtraction problems that will be discussed in the next session. The problems can be collected as a work sample.			●	●	●	
Session 5 Comparing Subtraction Strategies To begin, students discuss which strategies worked most efficiently for the subtraction problems they solved in Session 4. Then the teacher introduces a new Work Place game and students spend the remainder of the session visiting Work Places. Finally, the teacher assigns the Thinking about Subtraction Home Connection.	●			●		●

P&I – Problems & Investigations, **NS** – Number String, **MF** – Math Forum, **WP** – Work Places, **A** – Assessment, **HC** – Home Connection

Materials Preparation

Each session includes a complete list of the materials you'll need and notes about any preparation you'll need to do. If you would like to prepare materials for the entire module ahead of time, you can use this to-do list.

Copies & Display

☐ Visit the Bridges Educator Site to review the Interactive Display Materials for this module. Decide whether you will use digital materials for display or copies of print originals and student pages. Make copies as needed.

Work Places Preparation

☐ Prepare the materials for Work Place 4C using the Work Place Guide.

Charts

☐ Session 1: Title a piece of chart paper *Subtraction Strategies*.

Other

☐ Session 2: Cut a half-class set of 14-cm and 11-cm pieces of yarn or string. Each student pair will receive one string of either length.

☐ Session 3: You will review and select student work to be shared during the math forum in Session 4. Decide how you will review student work. You may choose to have students turn in their work or you may have time to review as students work. Your options include:
  - Print a copy of student book page 143 for students to use and turn in.
  - Have students tear the pages from their student books to turn in at the end of Session 3.
  - Have students turn in their student books at the end of Session 3.
  - Circulate and review students' work as they are working.

Concepts, Skills & Practices	Sessions					Work Places					
	1	**2**	**3**	**4**	**5**	**3B**	**3C**	**3E**	**4A**	**4B**	**4**
4.OA.3 Solve multistep word problems involving only whole numbers, using addition			HC								
4.NBT.1 Demonstrate an understanding that in a multidigit number, each digit represents ten times what it represents in the place to its right			P&I	MF A	P&I						
4.NBT.2 Compare multidigit numbers based on the meanings of the digits in each place		DP	HC								●
4.NBT.3 Use place value understanding to round multidigit whole numbers to any place										●	
4.NBT.4 Fluently add multidigit whole numbers, using an algorithm or another strategy	HC DP	P&I DP	DP HC		DP HC				●	●	●
4.NBT.4 Fluently subtract multidigit whole numbers, using an algorithm or another strategy	NS P&I DP	P&I DP	P&I HC DP	MF A DP	P&I DP HC						
4.NF.1 Recognize equivalent fractions						●					
4.NF.2 Use the symbols >, =, and < to record comparisons of two fractions with different numerators and different denominators	HC										
4.NF.3a Explain addition of fractions as joining parts referring to the same whole						●					
4.NF.3b Write an equation to show a fraction as the sum of other fractions with the same denominator						●					
4.NF.3b Express a fraction as the sum of other fractions with the same denominator in more than one way						●					
4.NF.3c Add and subtract fractions and mixed numbers with like denominators	DP										
4.NF.5 Add a fraction with denominator 10 to a fraction with denominator 100 by rewriting the first fraction as an equivalent fraction with denominator 100	DP		HC				●				
4.NF.6 Write fractions with denominators 10 and 100 in decimal notation	HC						●	●			
4.NF.7 Compare two decimal numbers with digits to the hundredths place; use the symbols >, =, and < to record the comparison; explain why one decimal number must be greater than or less than another decimal number			HC		DP		●	●			
4.MP.2 Reason abstractly and quantitatively			P&I								
4.MP.3 Construct viable arguments and critique the reasoning of others	NS		P&I	MF A	P&I						
4.MP.5 Use appropriate tools strategically	NS			MF A	P&I						
4.MP.8 Look for and express regularity in repeated reasoning		P&I									

P&I – Problems & Investigations, **NS** – Number String, **MF** – Math Forum, **A** – Assessment, **HC** – Home Connection, **DP** – Daily Practice

4

Session 1
Take Away or Find the Difference

Summary

This session begins with a review of two subtraction strategies taught in December Number Corner. Students use these strategies with greater numbers and discuss when it is best to use each. Students then spend the remainder of the session working on a set of related problems. At the end of the session, the teacher assigns the Think Before You Add Home Connection.

Module 2 Learning Goals
Students extend their understanding of subtraction strategies with multidigit numbers.

- ■ **Students compare and connect multidigit subtraction strategies.**
- ☐ Students make sense of the standard algorithm for subtraction.
- ☐ Students connect, compare, and select multidigit subtraction strategies, including the standard algorithm.

Materials

Number String Take Away or Find the Difference?	
Classroom Materials	• student math journals • chart paper (see Preparation)
Problems & Investigations Subtraction Situations	
Copies & Display	**SB 139** Subtraction Situations
Home Connection	
Copies & Display	**HC 75–76** Think Before You Add
Daily Practice	
Copies & Display	**SB 140** Subtraction Strategies

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary

Word Resource Card available

difference*
find the difference
subtraction
take away

Preparation

Title a piece of chart paper *Subtraction Strategies*. This session, you'll record students' subtraction strategies on a poster that you'll add to over the next several sessions. For each strategy, record a summary in such a way that will allow room for at least three more strategies to be recorded in future sessions. Hang the chart where students can reference it throughout the rest of the unit. To see an example poster with the strategies you'll most likely need to record, see Session 4.
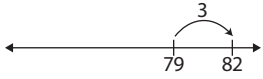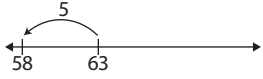
Number String

Take Away or Find the Difference?

The purpose of this number string is to compare two subtraction strategies, take away and find the difference, and to determine when each approach might be more efficient.

1 Pose the first two problems, one at a time.

Follow the procedures you have established for number strings. Write each equation on the display as you read it. When students share their thinking, record it on an open number line.

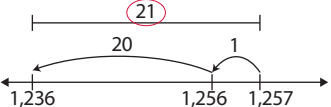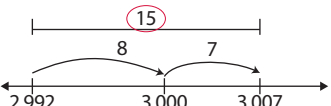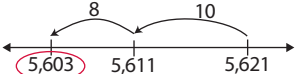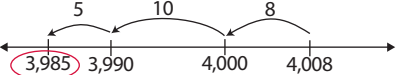**Number String** Take Away or Find the Difference?, Part 1

Problems	Sample Strategies & Recording	Connections
82 – 79	Students are more likely to find the difference between the two numbers because they are close to each other. Find the difference — *number line showing jump of 3 from 79 to 82*	Listen for students who find the difference for the first problem and use the take away strategy for the second.
63 – 5	Students are more likely to take 5 away from 63 because it's more efficient than finding the difference between 5 and 63. Take away — *number line showing jump of 5 from 58 to 63*	Use open number lines to model students' thinking for these two problems, and label the two strategies.

2 Invite students to think-pair-share about the different ways they approached the first two problems. With input from the class, circle the answers on the number lines for the first two problems and discuss how and why the answer locations are different.

3 Present the rest of the number string.

Number String Take Away or Find the Difference?, Part 2

Problems	Sample Strategies & Recording	Connections
1,257 – 1,236	Find the difference — *number line: 21 total, 20 + 1, from 1,236 to 1,256 to 1,257*	**Big Idea** Finding the difference between two numbers is more efficient when the numbers are close together. Students can add up from the subtrahend or jump back from the minuend. The difference is the sum of their jumps.
3,007 – 2,992	Find the difference — *number line: 15 total, 8 + 7, from 2,992 to 3,000 to 3,007*	
5,621 – 18	Take away — *number line: 8 + 10, from 5,603 to 5,611 to 5,621*	**Big Idea** The take away strategy is more efficient when the numbers are far away from each other. Students can jump backward by or to friendly numbers.
4,008 – 23	Take away — *number line: 5 + 10 + 8, from 3,985 to 3,990 to 4,000 to 4,008*	

4   Invite students to think-pair-share about when they might want to find the difference and when they might want to take away in a subtraction problem.

> **Teacher** *What is it about the problems we just solved that encouraged you to find the difference between the numbers? How are those problems different than those problems where you took away the second number?*
>
> **Sasha** *I took away the number when there wasn't very much to take away.*
>
> **Sean** *I found the difference between the numbers when they were close together.*
>
> **Teacher** *Why would you find the difference when they are close together?*
>
> **Sean** *Since they are close together, it takes fewer jumps to find how far apart they are.*

5   Ask students to explain in their own words how to use the take away and find the difference strategies. Have students share their thoughts and generate a class summary together.

6   Have students record the summary on the next blank page in their math journals. Below the summary, ask them to record one example for each strategy. They can use the open number lines students shared during the number string.

As students record the sample in their math journals, record the two strategies on the Subtraction Strategies poster.

🔍 Problems & Investigations

Subtraction Situations

7   Have students find to the Subtraction Situations page in their student books. Answer any questions they may have, then give them the remainder of the session to complete the assignment.

- Encourage students to consider both the find the difference and take away strategies when they work on this assignment. Let students know they can use any tools they find helpful.
- Give students the choice of working independently, with a partner, or in a small group with you.

MLL Work with students in a group. Read the questions aloud and clarify the meaning of any unfamiliar context words. Invite students to read the problems to each other.

SUPPORT Ask students what models might help them visualize what the problems are asking. Encourage students to look for friendly numbers as they employ strategies.

CHALLENGE Encourage students to write their own problem situations. They could write problems about the people in their family and when they were born.

8   Close the session by posing the following questions:

- *Which strategy — take away or find the difference — would you use to solve 1,001 – 2? Why?*
- *What about 1,001 – 997? Would it be more efficient to take away or to find the difference? Why?*

🏠 Home Connection

9   Introduce and assign the Think Before You Add Home Connection, which provides more practice with the following skills:

- Fluently add multidigit whole numbers, using an algorithm or another strategy
- Use the symbols >, =, and < to record comparisons of two fractions with different numerators and different denominators
- Write fractions with denominator 10 and 100 in decimal notation

📋 Daily Practice

The optional Subtraction Strategies student book page provides additional opportunities to apply the following skills:

- Fluently add and subtract multidigit whole numbers, using an algorithm or another strategy
- Add a fraction with denominator 10 to a fraction with denominator 100 by rewriting the first fraction as an equivalent fraction with denominator 100
- Add and subtract fractions and mixed numbers with like denominators

Session 2
Constant Difference

Summary

This session begins with a hands-on experience that helps students apply the constant difference strategy they learned in third grade and in December Number Corner to greater numbers. Students summarize how they can use the strategy to subtract before spending the remaining time at Work Places.

Module 2 Learning Goals
Students extend their understanding of subtraction strategies with multidigit numbers.

■ **Students compare and connect multidigit subtraction strategies.**
☐ Students make sense of the standard algorithm for subtraction.
☐ Students connect, compare, and select multidigit subtraction strategies, including the standard algorithm.

Materials

Problems & Investigations Constant Difference	
Copies & Display	**SB 141** Tape Measure Pieces
Classroom Materials	• student math journals • lengths of string or yarn (see Preparation) • Subtraction Strategies poster from Session 1 • copy paper (1 sheet, for cover)
Work Places in Use	
3B Racing Fractions (introduced in Unit 3, Module 2, Session 6) **3C** Decimal Four Spins to Win (introduced in Unit 3, Module 3, Session 3) **3D** Decimal More or Less (introduced in Unit 3, Module 3, Session 4) **3E** Fractions & Decimals (introduced in Unit 3, Module 4, Session 2) **4A** Target 1,000 (introduced in Unit 4, Module 1, Session 2) **4B** Add, Round & Compare (introduced in Unit 4, Module 1, Session 4)	
Daily Practice	
Copies & Display	**SB 142** Rolling Dice

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Preparation

• Cut a half-class set of 14-cm and 11-cm pieces of yarn or string. Each student pair will receive one string of either length.
• Write a list on the board of the Work Places available to students today. You can write the numbers 3B–4B or the full names.

Vocabulary
Word Resource Card available

constant difference
difference*
find the difference
minuend
subtraction
subtrahend
take away

🔍 Problems & Investigations

Constant Difference

1 Display the Tape Measure Pieces student book page, keeping the text below the tape measure pieces covered for now. Invite students to share what they notice and what they wonder.

Discuss how we typically measure length by placing an object at the 0 end of a ruler or tape measure. Ask how having a tape measure without the 0 end would change how students could measure the length of an object.

2 Invite a volunteer to hold up their pencil. Let students know you will ask them to estimate the length of the pencil in centimeters.
   - Ask whether there's anything, other than a measuring tool, that they'd like you to hold the pencil in front of to help them estimate. For example, the pencil could be held up next to a book or something else that students can use as a benchmark.
   - Record students' estimates on the display.

3 Ask the volunteer to place their pencil on the display next to a piece of the tape measure, then find the length of the pencil.
   - Compare the result to students' estimates and ask whether the length seems reasonable. If the result doesn't seem reasonable, ask students which of their strategies they'd like to try to confirm the length.
   - If the strategy used did not involve subtraction, ask students how they could use subtraction to find the length of the pencil. Invite a student to record the subtraction equation on the display.

4 Ask students what would happen if they moved the pencil to a different piece of the tape measure. Would the numbers where the pencil start and end change? Would that change the length of the pencil?
   - Invite students to think-pair-share where they would like to put the pencil to measure it again. Ask pairs to choose a number where they would want the pencil to start or end. Suggest they find a place where it would be fairly simple to find the length of the pencil.
   - Invite several pairs to share their choices, move the pencil on the display, and record the subtraction equation. Ask whether the result is as they expected and, if not, ask what they think happened.

   Shonda *We want to put the pencil so it starts at 60.*
   Teacher *Why did you choose 60?*

Shonda I can subtract it mentally.

Teacher Why do you need to subtract?

Manuel The other end of the pencil is at 68. The pencil isn't 68 centimeters long. We have to subtract 60 because the pencil doesn't start at the 0 mark.
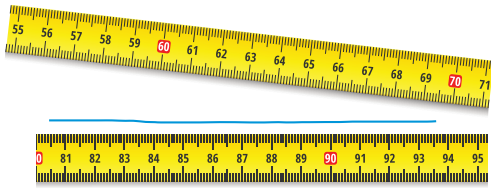
5 Ask student helpers to distribute a length of string to each pair of students. Reveal the rest of the student book page on display, and have students find Tape Measure Pieces in their student books.

- Invite students to work with a partner to find the length of their piece of string. Let them know they should find the length two different ways and record their thinking.

- Circulate as students work. Remind students they can place the string anywhere they want on either tape measure piece as long as they can accurately find their string's length.

- Observe where students choose to place their pieces of string, keeping in mind examples you would like students to share. You may want to choose two examples for each string so students can compare and contrast strategies.

SUPPORT Let student pairs know which problem you would like them to share. If they are comfortable sharing, let them know you want them to share how they chose where they placed the string to find their answer. You might also suggest students practice sharing their thinking with each other.

6 Invite the students you selected to share their thinking about where they placed their string on the tape measure and show how they used that placement to find the length of the string.

- After two student pairs have shared for one string, ask the class to share any subtraction problems they solved that are different from those already shared. List the expressions on the display.

- Repeat the same process for the other string.

Unit 4 Module 2 | Session 2 *printed at actual size (100%)*

NAME | DATE

🔍 **Tape Measure Pieces**

1 Dakota wants to measure their pencil. They could only find these pieces of a measuring tape. How can Dakota use them to measure their pencil?

$94 - 80 = 14$

7 Ask students to look at the two lists of expressions used to find the lengths of the two strings. Ask why different expressions could be used to find the same answer.

- Discuss how the difference between the two numbers in the expressions didn't change. Explain that the difference represents the length of the string, and the length of the string didn't change.

- Ask students which pair of numbers they think are easier to subtract and to explain their reasoning.

Math Practices in Action

Look for and express regularity in repeated reasoning

After making several adjustments of the string along the tape measure, students will notice which adjustments make it easier for them to find the length of the string. Students will use this reasoning to help them make adjustments when solving other subtraction problems.

Equity-Based Practice

Going deep with mathematics

This activity helps students see how numbers can be adjusted to make them more efficient to subtract. Discussing these adjustments and why making them does not change the outcome requires going deep with mathematics.

8   Record the problem 177 – 56 on the display. Ask students to imagine that they have a piece of string that starts at 56 on a tape measure and ends at 177. Invite students to think-pair-share how they could use the strategy they used with their string to solve this problem.

   • Give students a moment to think on their own before they share their thoughts with a partner. Remind partners to give each other the opportunity to share before they decide how they will solve the problem.

   • When students share, encourage them to describe how they decided what to do.

   Alison *We saw that 56 is close to 60, so we changed 56 to 60.*

   Teacher *Can you do that? Can you change the numbers in the problem?*

   Kai *We did that with our string. We moved the string along the tape measure until we found numbers that were easy to subtract.*

   Alison *And just like with the string, we knew the other number would change, too. Since we shifted 56 to the right four to get to 60, we needed to shift 177 four to the right to get to 181.*

   Teacher *Did anyone else change the numbers in the problem? Can you share your thinking?*

9   Have students find the next blank page in their math journals. Ask them to record the date and then title the page Constant Difference.

   • Ask students why they think *constant difference* is a good name for the strategy they have been exploring.

   • As a class, decide on a good way to describe the constant difference strategy and ask students to record this in their journals. Then ask them to record an equation to show their thinking when solving 177 – 56.

   • As students record a sample in their math journals, record an example on the Subtraction Strategies poster.

   ## Constant Difference

   You can change one number in a subtraction problem to make it easier to subtract, but you have to make the same change to the other number.

	Example	177 + 4	181
		– 56 + 4	– 60
			121

10 Ask students to work with a partner to complete the last problem on the student book page using the constant difference strategy.

   When students have solved at least one problem, invite volunteers to share how they adjusted the numbers in the problem to subtract them more efficiently.

🗑 Work Places

11 Have students put away their math journals and student books and spend the remainder of the session at Work Places.

- Have students get their Work Place folders and a pencil.

- Remind students to fill out their Work Place Logs as they finish each activity.

Encourage students to choose Work Places that will help them with skills and concepts that may have been challenging for them in this unit or in Unit 3.

12 Circulate to observe and take notes, or work with small groups who might benefit from additional support. Suggest specific Work Places for students who might benefit from extra practice. Use the following chart as a guide throughout this module to help prepare students for the Unit 4 Assessment.

Items	Area for Practice	Differentiation
Place Value and Addition Checkpoint		
1	Reading and writing multidigit whole numbers	• Math at Home Grade 4 Activity: Same & Different: World Records https://mathathome.mathlearningcenter.org/activity/1493 • Home Connection Module 4, Session 1: Unit 4 Review, Part 1
2	Rounding whole numbers to any place	• Work Place 4B Add, Round, & Compare • Daily Practice Module 1, Session 2: Round 'Em Up
3	Comparing multidigit whole numbers	• Home Connection Module 1, Session 4: Greater Numbers • Bridges Intervention Volume 3, Module 9, Session 41: Numbers to 1,000
4–5	Adding multidigit whole numbers	• Work Places 4A Target 1,000 and 4B Add, Round, & Compare • Bridges Intervention Volume 3, Module 12, Session 57: Adding Large Numbers, Revisited

13 Close this session by asking students to put away their materials quietly as they think about an addition or subtraction strategy they have used recently or want to use soon. Invite a few students to share what they know about the strategies they have used or want to use.

Daily Practice

The optional Rolling Dice student book page provides additional opportunities to apply the following skills:

- Compare multidigit numbers based on the meanings of the digits in each place
- Fluently add and subtract multidigit whole numbers, using an algorithm or another strategy

Session 3
The Standard Algorithm for Multidigit Subtraction

Summary

After a warm-up related to regrouping, students work in pairs to represent and solve a subtraction problem situation using base ten number pieces and then share their strategies. The class works together to solve two problems, representing and recording them using the standard algorithm for subtraction. Then students solve a group of problems using any strategy in preparation for the math forum during the next session. At the end of the session, the teacher assigns the Number Cards Home Connection.

Module 2 Learning Goals
Students extend their understanding of subtraction strategies with multidigit numbers.

☐ Students compare and connect multidigit subtraction strategies.

■ **Students make sense of the standard algorithm for subtraction.**

☐ Students connect, compare, and select multidigit subtraction strategies, including the standard algorithm.

Materials

Problems & Investigations The Standard Algorithm for Multidigit Subtraction	
Copies & Display	**PO P1** Subtracting by Place **PO P2** More Subtraction Situations **PO P3–P6** Subtraction Strategies Forum Discourse Planner **SB 143** Subtraction Practice
Kit Materials	base ten number pieces (class set)
Classroom Materials	• student math journals • Subtraction Strategies poster from Session 1 • copy paper (1 sheet, for cover)
Home Connection	
Copies & Display	**HC 77–78** Number Cards
Daily Practice	
Copies & Display	**SB 144** When Was That Invented?

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary
Word Resource Card available

algorithm*
difference*
minuend
regrouping
subtrahend

Preparation

You will review and select student work to be shared during the math forum in the next session. Decide how you will review student work. You may choose to have students turn in their work or you may have time to review as students work. Before the math forum, use the Subtraction Strategies Forum Discourse Planner to record the strategies you want shared.

🔍 Problems & Investigations

The Standard Algorithm for Multidigit Subtraction

Subtracting by Place

1   Open the session by conducting a warm-up activity related to regrouping.

   - Invite volunteers to give each student a set of base ten number pieces.
   - Display only the first problem on the Subtracting by Place print original. Invite students to solve the problem in a way that makes sense to them.
   - Let students know there may be more than one way to represent the answer for each problem and that they can use the base ten number pieces to help them think about other solutions.
   - Ask students to show thumbs-up in front of their chest when they have found a solution.
   - Invite volunteers to share and explain their solutions.
   - Keeping a quick pace, repeat the same process for the remaining problems.

> Unit 4 Module 2 | **Session 3** *1 copy for display*
>
> 🔍 **Subtracting by Place**
>
> Find each difference. There may be more than one way to represent each difference.
>
> **1**   1 ten – 7 ones

Monumental Subtraction

2   Ask students whether they have ever seen the Washington Monument, the Gateway Arch, or Golden Gate Bridge in person or in pictures. Give students a few moments to share what they know about these structures.

3   Before displaying the first problem on the More Subtraction Situations print original, ask students which monument they think is taller — the Gateway Arch or the Washington Monument. Then reveal the first question and read it aloud with the class.

   - Ask students to restate the question in their own words.
   - Invite students to think-pair-share an estimate for the problem. Record their estimates on the display.

4   Ask students to work with a partner to represent and solve the problem.

   - Student pairs will need two sets of base ten number pieces in order to model the problem together.
   - Ask students to record all their work, including the solution, in their math journals.
   - Challenge students who finish early to find another way to solve the problem, either with or without using base ten number pieces.
   - Circulate as students work and watch for a variety of strategies. Some students may regroup base ten number pieces without formally recording the standard algorithm. Make note of these students and plan for them to share last.

🖥️ **Digital Resources**

The Bridges Educator Site contains support materials such as photos of the three landmarks discussed during this session. If your students are not familiar with the Washington Monument, the Gateway Arch, or the Golden Gate Bridge, consider sharing the photos of these landmarks before beginning the session.

- If you see pairs who appear to be trying to regroup, encourage this line of thinking by asking questions like these:
  - » *Is there a way to get the ones (tens) you need to subtract?*
  - » *How could you find 3 tens minus 5 ones?*
  - » *What if you only had 5 hundred pieces? How could you represent 630?*

5   Conduct an open strategy share discussion by selecting student pairs to explain their strategies.

- Record any new strategies on the Subtraction Strategies poster.
- Students may use the find the difference strategy to add up from 555 to 630. They may also use the constant difference strategy by adding 45 to the minuend and subtrahend to make a friendlier problem: 675 – 600.
- Have a student who used actions similar to the standard algorithm share last. If no one used this strategy, present it as a way you saw students in last year's class solve the problem.

Teacher Shari and Ted, I noticed that you were exchanging groups of base ten number pieces, and it looked really interesting. Would you please share your strategy?

Shari We made 630 using hundreds and tens pieces. Then we started subtracting ones. We had to subtract 5 ones but didn't have them. So we took one of the tens pieces and traded it for 10 ones, and then we could take 5 away.

Ted Then we did something like that for the tens. We only had 2 tens and needed to subtract 5 tens, so we replaced one of the hundreds pieces with 10 tens pieces. Then we could take away 5 of them.

Shari We had 5 hundreds pieces left, and we had to take 500 away. We had 75 left.

Teacher Does this remind anyone of a strategy we've used before?

Jason Yeah, it sounds like the take away strategy because they took 555 away from 630.

Teacher I agree. But there was also a lot of trading going on. I recorded those steps as you said them. Now, let's investigate why they work.
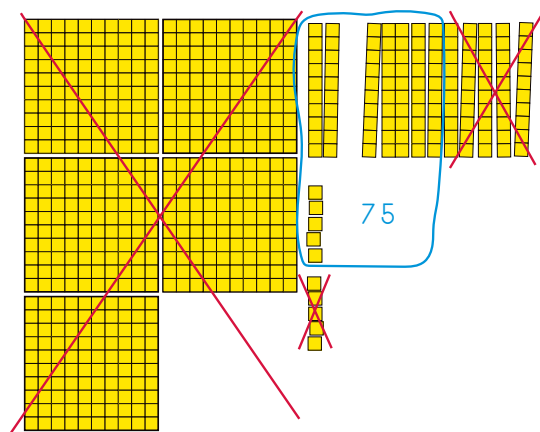
6   Tell students they are going to use base ten number pieces to explore the standard algorithm for solving multidigit subtraction problems.

You might mention that this is a method many adults are familiar with, and acknowledge that some students might be as well.
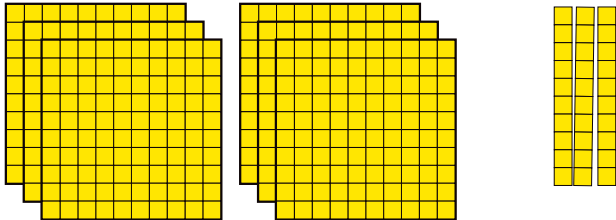
> **Instructional Routine**
>
> **Open strategy sharing**
>
> The purpose of an open strategy share (Kazemi & Hintz, 2014) discussion is for students to see a variety of strategies they could potentially use to solve future problems. This structure also gives students the opportunity to revoice strategies and make connections among strategies. Doing so will strengthen their subtraction flexibility.

MLL & SUPPORT Use gestures as you work, and make sure students can see the actions you are taking and how they relate to what you record. Try to engage students as much as possible. For example, invite them to make the trades as you record answers. Ask students whether they have seen this method, or one like it, before.

7   Write 630 – 555, then label three columns with place values. Build 630 with base ten number pieces, then write each number in the problem in expanded form.

Digital Resources

Consider using the Number Pieces app to display base ten number pieces for the class to see. You might even use different colors to show different place values.

Apps are available at apps.mathlearningcenter.org.

Hundreds 100s   Tens 10s   Ones 1s

```
  630      600      30      0
- 555    - 500    - 50    - 5
```

8   Tell students they will reenact the trading strategy so they can see how it works. Ask the students who used this strategy to help clarify what's happening.

Ask some of the following questions as the class reenacts the strategy. Repeat the questions with each place value. Invite volunteers to show the trading actions and how they are recorded numerically on the display.

» *What was the first step Shari and Ted did?* (They traded 1 ten for 10 ones.)

» *Why did Shari and Ted need to make that trade?* (They needed to subtract 5 ones and didn't have any ones in the ones place to subtract from.)

» *How can we record the trade of 1 ten for 10 ones?* (Cross out the 3 in 630 and make it a 2 for 2 tens. Then cross out the 0 in the ones place and make it 10. That is 600 + 20 + 10.)

» *How many ones do we have in the ones place now?* (10)

» *Then what did they do?* (They subtracted the ones. There are 5 ones left.)

```
  2 10                      20       10
  6 3̶ 0̶      600      3̶0̶       0̶
- 5 5 5    - 500    - 50    - 5
                                 5
```

Some students might say it is not possible to subtract 5 from 0. Other students might say the answer is a negative number. Let students know that it is, in fact, possible to subtract 5 from 0. Explain that to do so, they would need to use negative numbers, which they will learn in the future. Acknowledge negative numbers, but move on by explaining that the standard algorithm uses regrouping instead of negative numbers.

$$
\begin{array}{cccc}
\overset{12}{\underset{5\ \not{7}\ 10}{\not{6}\not{3}\not{0}}} & \overset{500}{\not{6}\not{0}\not{0}} & \overset{120}{\underset{}{\not{3}\not{0}}} & \overset{10}{\not{0}} \\
-\ 555 & -\ 500 & -\ 50 & -\ 5 \\
\hline
75 & & 70 & 0
\end{array}
$$

Trade 1 ten for ten ones
and subtract 5 ones.

Trade 1 hundred for 10
tens and subtract 5 tens.

9 Ask students if they have any questions about the process they just used to subtract.

10 Let students know that this is the standard algorithm for subtraction. Explain that the trading Shari and Ted did is called regrouping, just as students learned with the standard algorithm for addition. Ask students to compare the two algorithms.

With addition, the ones are regrouped as tens and the tens are regrouped as hundreds. With subtraction, the tens are regrouped as ones and the hundreds are regrouped as tens.

11 Reveal the second problem on the More Subtraction Situations print original. Ask students to use base ten number pieces and the standard algorithm to solve the problem. Remind them to record their actions using numbers.

12 After students have finished solving the problem, invite volunteers to use base ten number pieces at the display to show how they solved the problem. Invite another volunteer to show how they recorded their thinking with numbers.

Discuss the actions students took as they regrouped.

13 Introduce problem 3, and have students think-pair-share about how the problem was solved.

• Discuss how students can model 1,000 using base ten number pieces. They should recognize that they can use 10 hundreds pieces to represent 1,000.

• Discuss problem 3 by asking:
   » *Was the problem solved correctly?*
   » *If not, what could you do to correct the solution?*

14   When the class agrees that the problem was solved incorrectly, reveal
      problem 4 and repeat step 3.

      Problem 4 has a number in the thousands place. Students may choose to create a
      representation of 1,000 and keep track of when they replace one of the thousands with
      10 hundreds. You may want to remind students of the 1,000 strips they made with
      10 hundred squares in Unit 1.

15   Have students find the next blank page in their math journals and add
      an entry for the standard subtraction algorithm.

      Have students title the page Subtraction Algorithm and record an example from
      today's session.

16   Then display the Subtraction Practice page as students find the page in
      their student books. Have students choose two or more of the problem
      situations and two or more of the remaining problems to solve. Let them
      know they can use any strategy to solve the problem situations, but they
      should use the standard algorithm for subtraction for problem 4.

      • Let students know they can choose to work with a partner but that both partners
        need to record their thinking on their student book page.

      • Circulate as students work to identify those students you'd like to have share as
        part of the math forum during the next session. Use the Subtraction Strategies
        Forum Discourse Planner to make notes about the strategies students are using
        and for suggested assessing and advancing questions to ask students as they work.

      SUPPORT Read the problem situations aloud. Encourage students to first represent the
      situations using base ten number pieces, then use them to do the trading.

17   Close the session by letting students know they will participate in a math
      forum during the next session. Collect their student book pages to review.

      During the next session's math forum, students will share the strategies you select for
      the first three problems on the student book page. Collect students' work if you have
      not had time to review in preparation for the Math Forum in Session 4.

🏠 Home Connection

18   Introduce and assign the Number Cards Home Connection, which
      provides more practice with the following skills:

      • Add a fraction with denominator 10 to a fraction with denominator 100 by rewrit-
        ing the first fraction as an equivalent fraction with denominator 100

      • Compare two decimal numbers with digits to the hundredths place

      • Solve multistep word problems involving only whole numbers, using addition

      • Fluently add and subtract multidigit whole numbers, using an algorithm or
        another strategy

      • Compare multidigit numbers based on the meanings of the digits in each place

📐 Daily Practice

The optional When Was That Invented? student book page provides additional
opportunities to apply the following skill:

      • Fluently add and subtract multidigit whole numbers, using an algorithm or
        another strategy

Session 4
Subtraction Strategies Math Forum

Summary

Students participate in a math forum and discuss which numbers in multidigit subtraction problems lend themselves to particular strategies. Then they spend the rest of the session working independently on subtraction problems that will be discussed in the next session. The problems can be collected as a work sample.

Module 2 Learning Goals

Students extend their understanding of subtraction strategies with multidigit numbers.

☐ Students compare and connect multidigit subtraction strategies.

☐ Students make sense of the standard algorithm for subtraction.

■ **Students connect, compare, and select multidigit subtraction strategies, including the standard algorithm.**

Materials

Math Forum Subtraction Strategies	
Classroom Materials	• Subtraction Practice (SB 143) from Session 3 • Subtraction Strategies Forum Discourse Planner (PO P3–P6) from Session 3 • Subtraction Strategies poster from Session 1
Assessment Subtraction Strategies Work Sample	
Copies & Display	**PO P7** Subtraction Strategies Work Sample
Kit Materials	base ten number pieces
Classroom Materials	student math journals
Work Places in Use	
3B Racing Fractions (introduced in Unit 3, Module 2, Session 6) **3C** Decimal Four Spins to Win (introduced in Unit 3, Module 3, Session 3) **3D** Decimal More or Less (introduced in Unit 3, Module 3, Session 4) **3E** Fractions & Decimals (introduced in Unit 3, Module 4, Session 2) **4A** Target 1,000 (introduced in Unit 4, Module 1, Session 2) **4B** Add, Round & Compare (introduced in Unit 4, Module 1, Session 4)	
Daily Practice	
Copies & Display	**SB 145** Using Subtraction Strategies

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Preparation

Write a list on the board of the Work Places available to students today. You can write the numbers 3B–4B or the full names.

Vocabulary

Word Resource Card available

algorithm*
difference*
regroup
remove
subtraction

💬 Math Forum

Subtraction Strategies

1 Let students know they will be participating in a math forum. Redistribute student's work on the Subtraction Practice student book page if you collected it at the end of Session 3.

- Give students time to solve any remaining problems as you ask students whether they would be willing to share the strategies you selected later in the session.

SUPPORT Encourage student pairs to practice explaining their strategy to another student pair.

2 Review the procedure for participating in a math forum.

- Only some student pairs will present their work, but everyone will participate by adding to what the presenters share, asking questions, talking with a partner, and thinking about how they can use what is shared to solve other problems.
- Forums are times for learning. As students talk and think, they should be learning something new or understanding something more clearly.
- All students need to be respectful at all times.

3 Invite students to find and read the ABCs of Math Talk in their student books.

- Review the Connect and Clarify sentence starters and questions. Ask students how they might use these when they are responding to a classmate's strategy.
- Let students know that the focus of this math forum is to find ways students' strategies are related. And, as always, they should ask questions to help them understand each other's strategies.

4 Invite the students you selected to share their strategies and the class to ask questions.

- As you work through the forum, you don't have to review all three problem situations, but do include a mix of efficient and less efficient strategies so students can begin recognizing the difference.
- Use some of the questions recorded on the Subtraction Strategies Forum Discourse Planner to encourage students to clarify their understanding of their classmates' thinking and make connections between solution strategies.

MLL Encourage students who share their thinking to use gestures to indicate each part of their model as they refer to it.

5 Once students have shared the examples you selected, ask students to compare their choice of strategy with the other strategies presented and discuss which is the most efficient for them. Encourage them to generalize what characteristics of certain numbers lend the problem to particular strategies.
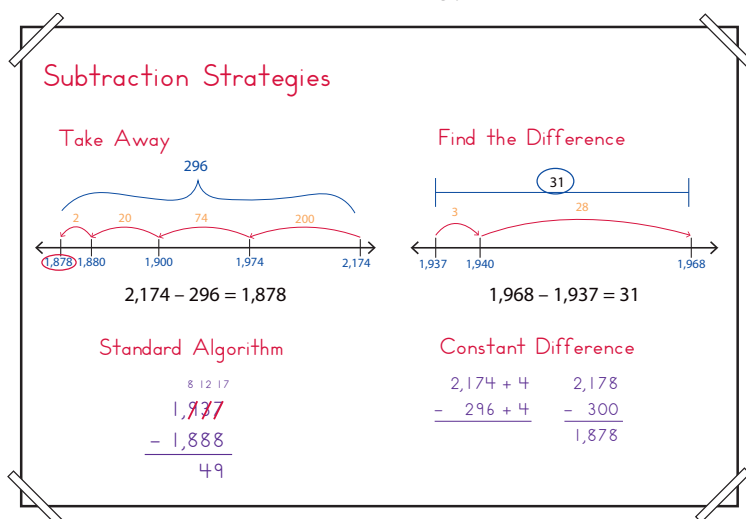

⊡ Math Teaching Practice

Use and connect mathematical representations

Asking questions from the Connecting Responses section of the Subtraction Strategies Forum Discourse Planner will help students see relationships between the strategies. Seeing these connections helps students who rely on one strategy to feel more confident in trying another, possibly more efficient, strategy.

What Makes a Strategy Efficient?

6   Review the strategies that students presented during the math forum. Record any new strategies on the Subtraction Strategies poster as students describe in words how the strategy works.

Subtraction Strategies

Take Away

296

2   20   74   200

1,878 1,880   1,900   1,974   2,174

2,174 − 296 = 1,878

Find the Difference

31

3   28

1,937 1,940   1,968

1,968 − 1,937 = 31

Standard Algorithm

8 12 17

1,937
− 1,888
   49

Constant Difference

2,174 + 4   2,178
− 296 + 4   − 300
             1,878

7   Let students know that their goal when solving addition and subtraction problems is to solve them in the most efficient way. Spend some time talking about what makes a strategy efficient. Make sure to mention that what's efficient for one person might not be efficient for another. Also, what's efficient for one problem may not be for another.

To help students better understand what makes a strategy efficient, ask them to name strategies or tools that are not efficient. When describing efficiency, they might mention things that take less time or that they can do mentally. When describing inefficiency, students might mention things that take a lot of time, such as making many short jumps on the number line.

8   Display the Subtraction Practice student book page and direct students' attention to the last row of problems. Ask students to think about the most efficient strategy for each problem based on the numbers in the problem.

- Ask students to look first at the problems they haven't completed yet, then to look at those they have solved and to see whether there's a more efficient strategy than the standard algorithm.
- Invite students to share what they would find more efficient for each problem and to share their reasoning.
- After discussing all the problems, ask students to complete those they haven't yet solved using the strategy they would find most efficient.

📠 Assessment

Subtraction Strategies Work Sample

9 Have students put away their student books and get out their math journals while you hand out the Subtraction Strategies Work Sample.

- Have students work independently on the problems.
- Let students know they can refer to the Subtraction Strategies poster or their math journals to help them choose efficient strategies.
- Make base ten number pieces available to students to use if they would like.
- If time is running short, ask students to choose two problems to solve.

CHALLENGE Ask students who finish early to make sure they have used the most efficient strategy and then to generalize what numbers work best for each strategy.

Note

Before Session 5, read through students' completed Subtraction Strategies Work Samples and select two or more strategies you'd like shared for each problem. Choose efficient strategies or strategies that show mathematical thinking that would benefit your students. Try to select a variety of methods over the course of the three problems.

🗑️ Work Places

10 As students complete their work sample, have them get their Work Place folders and a pencil and go to Work Places.

- Encourage students who need more practice with the addition and subtraction strategies to go to Work Places 4A and 4B.
- Remind students to fill out their Work Place Logs as they finish each activity.

11 Close the session by asking students how they could subtract 999 from any 4-digit number.

📅 Daily Practice

The optional Using Subtraction Strategies student book page provides additional opportunities to apply the following skill:

- Fluently subtract multidigit whole numbers, using an algorithm or another strategy

Session 5

Comparing Subtraction Strategies

Summary

To begin, students discuss which strategies worked most efficiently for the subtraction problems they solved in Session 4. Then the teacher introduces a new Work Place game and students spend the remainder of the session visiting Work Places. Finally, the teacher assigns the Thinking about Subtraction Home Connection.

Module 2 Learning Goals
Students extend their understanding of subtraction strategies with multidigit numbers.

☐ Students compare and connect multidigit subtraction strategies.

☐ Students make sense of the standard algorithm for subtraction.

■ **Students connect, compare, and select multidigit subtraction strategies, including the standard algorithm.**

Materials

Problems & Investigations Comparing Subtraction Strategies	
Classroom Materials	• Subtraction Strategies Work Sample (PO P7 from Session 4) • Subtraction Strategies poster from Session 1
Problems & Investigations Introducing Work Place 4C Roll & Subtract 1,000	
Copies & Display	**PO P8** Work Place Guide 4C Roll & Subtract 1,000 **PO P9** 4C Roll & Subtract 1,000 record sheet (class set) **SB 146** Work Place Instructions 4C Roll & Subtract 1,000
Kit Materials	3 dice numbered 1–6
Classroom Materials	sticky notes (1 per student)
Work Places in Use	
3B Racing Fractions (introduced in Unit 3, Module 2, Session 6) **3C** Decimal Four Spins to Win (introduced in Unit 3, Module 3, Session 3) **3E** Fractions & Decimals (introduced in Unit 3, Module 4, Session 2) **4A** Target 1,000 (introduced in Unit 4, Module 1, Session 2) **4B** Add, Round & Compare (introduced in Unit 4, Module 1, Session 4) **4C** Roll & Subtract 1,000 (introduced in this session)	
Home Connection	
Copies & Display	**HC 79–80** Thinking About Subtraction
Daily Practice	
Copies & Display	**SB 147** Helpful Hints

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary
Word Resource Card available

algorithm*
subtraction

Preparation

- Look through students' completed Subtraction Strategies Work Samples from Session 4 and select two or more samples of each problem that you would like the class to see. Choose samples that include efficient alternative strategies, and try to represent a variety of methods over the course of the three problems. Record the names of the students and invite them to share their work.
- In today's session, you'll introduce Work Place 4C Roll & Subtract 1,000, which replaces 3D Decimal More or Less. Read the Work Place Guide and Instructions, including suggestions for differentiating the activity to meet students' needs. Assemble the materials listed on the Guide, and place them in the Work Place tray.
- Write a list on the board of the Work Places available to students today. You can write the numbers (3B, 3C, 3E-4C) or write out the full names.

🔍 Problems & Investigations

Comparing Subtraction Strategies

1   Return students' Subtraction Strategies Work Samples from Session 4, and give them a few minutes to look over their work. Then invite the students you selected to share either an alternative strategy or the standard algorithm for each problem in the work sample.

Ask students to discuss the characteristics of the numbers in the problems that lend themselves to one method or another.

> **Whitney** *When the numbers are close together, it's easier to find the difference.*
>
> **Bobbie** *If the numbers are far apart, I like to take away. Since they are far apart, the amount to take away is not a lot.*
>
> **Carlos** *If there's no regrouping, it's easier for me to line them up and subtract with the standard algorithm, especially when the numbers get big.*
>
> **Dominic** *Some numbers are too messy to do in your head and for those, it's easier for me to use the standard algorithm.*
>
> **Sally** *If I can shift both numbers up or down easily, I like to use the constant difference strategy.*

💡 Math Practices in Action

Construct viable arguments and critique the reasoning of others

Students think carefully about strategies and number relationships when they justify their choice of strategy for a particular problem. When they construct viable arguments and critique the reasoning of others in this way, they gain clarity about when it makes the best sense to use a particular strategy.

🔍 Problems & Investigations

Introducing Work Place 4C Roll & Subtract

2   Display the Roll & Subtract 1,000 record sheet.
- Explain that you'll introduce a new Work Place game by playing it with the class.
- Let students know that this game will help them choose the most efficient strategy for solving each multidigit subtraction problem.

3   Briefly summarize the game before playing against the class.

Players roll three dice numbered 1–6 and arrange the digits to form a 3-digit number, which they then subtract from 1,000. After that, they each take two more turns to roll the dice, arrange the digits, and subtract from what's left after their previous turn. The goal of the game is to be the closest to 0 after three turns without going into negative numbers.

4   Play a game of Roll & Subtract 1,000 against the class, referring to the Work Place Instructions 4C Roll & Subtract 1,000 student book page as needed.

- Invite a student helper to give each student a copy of the 4C Roll & Subtract 1,000 record sheet.

- Take turns with the class, rolling, arranging the digits, and subtracting each turn.

- Each time you take your turn, verbalize the strategies you use to arrange the digits to subtract a good amount without risking subtracting more than 1,000 within the three turns you are allowed. Once you've recorded the subtraction problem, work with input from the class to consider the various strategies available. Highlight how you choose the more efficient strategy, given your numbers.

- Ask students to record your turn on their record sheet, using the subtraction strategy they find most efficient.

- Each time the class takes a turn, invite students to make their own choice of how best to arrange the digits rolled and perform the subtraction using an efficient strategy. Ask one or two students to share their thinking about their decision and the subtraction. Since there is no correct choice, decide on the best way for the class to commit to a move for their turn.

- As you take turns with the class, pose questions such as the following:

   » *What are some of the different ways you might arrange the three digits your classmate just rolled?*

   » *Which of the possible 3-digit numbers you can make seems the most advantageous? Why?*

   » *Which subtraction strategy would be the most efficient for this particular pair of numbers? Why?*

5   When the game is over, ask students to report their score to determine the winner. Then have students find the Work Place Instructions 4C Roll & Subtract 1,000 page in their student books.

- Ask students to read and review the game rules with a partner.

- Answer any questions they still have about the game.

6   Invite a student helper to give each student a sticky note.

- Ask students to record an addition or subtraction problem they solve during Work Places.

- Let them know they'll work with this problem at the end of the session.

- Encourage them to think about the most efficient strategy to solve the problem.

- After students record a problem, ask them to place the sticky note on one of the strategy posters near the strategy they used.

🗑️ Work Places

7   Send students to Work Places.

- Have students get their Work Place folders and a pencil.
- Remind students to fill out their Work Place Logs as they finish each activity.

8   Circulate to observe and take notes, or work with small groups who might benefit from additional support.

See the Work Place Guides for differentiation suggestions.

9   When there are about 5 minutes remaining, ask students to put away their materials. Ask questions like these to discuss the strategies students used during Work Places:

- *Did you add a sticky to one of the strategies posters? Which strategy did you use?*
- *What was it about the numbers that made you choose that strategy?*
- *Which strategies were more efficient for you? Why?*

🏠 Home Connection

10   Introduce and assign the Thinking About Subtraction Home Connection, which provides more practice with the following skill:

- Fluently add and subtract multidigit whole numbers, using an algorithm or another strategy

📐 Daily Practice

The optional Helpful Hints student book page provides additional opportunities to apply the following skills:

- Use >, =, and < symbols to record comparisons of two multidigit numbers
- Fluently add and subtract multidigit whole numbers, using an algorithm or another strategy

Print Originals & Student Pages

bridges®
in mathematics

🔍 **Subtracting by Place**

Find each difference. There may be more than one way to represent each difference.

1 1 ten – 7 ones

2 7 tens – 9 ones

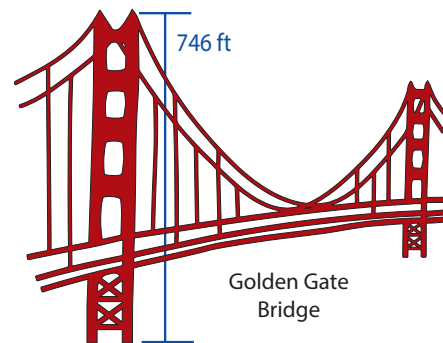**3** 3 hundreds – 6 tens

4 2 hundreds – 4 ones

🔍 More Subtraction Situations

1 How much taller is the Gateway Arch than the Washington Monument?

Gateway Arch

630 ft

555 ft

Washington Monument
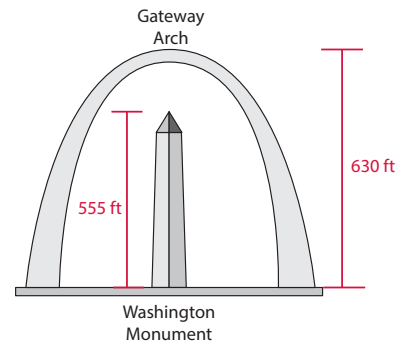
2 How much taller is one of the towers of the Golden Gate Bridge than the Washington Monument?

746 ft

Golden Gate Bridge

3 There are 1,076 steps in one leg of the Gateway Arch. There are 896 steps to the top of the Washington Monument. Rajesh recorded the subtraction problem below. Does this show how many more steps there are in one leg of the Gateway Arch than in the Washington Monument? Why or why not?

$$
\begin{array}{r}
1{,}076 \\
-896 \\
\hline
220
\end{array}
$$

4 The Golden Gate Bridge is 6,450 feet long. The base of the Gateway Arch is 630 feet wide. Look at the problem below. Does it show how much longer the Golden Gate Bridge is than the base of the Gateway Arch? Why or why not?

$$
\begin{array}{r}
\overset{5\ \ 13}{6{,}\cancel{4}50} \\
-630 \\
\hline
5{,}720
\end{array}
$$

Subtraction Strategies Forum Discourse Planner page 1 of 4

Monitoring Tool

Anticipated Solution Paths	Instructional Support		Who and What	Order
What ways might students approach the task or activity (including correct, incorrect, and incomplete thinking)?	**Assessing Questions** What will you ask to support exploration?	**Advancing Questions** What will you ask to connect what students did with what you want them to learn?	Who is using the strategy or a variation? Make note of any differences between students' strategies.	In what order will students present?
A. Take away (using a number line) 296 2 20 74 200 1,878 1,880 1,900 1,940 1,974 2,174	• How did you know when to stop making jumps? • How did you choose the numbers for your jumps?	• What made the numbers in this problem work for this strategy? • Is it possible to take away using fewer jumps? • What would this look like as equations?		
B. Find the difference (using a number line) 31 28 3 1,937 1,940 1,968 1,968 – 1,937 = 31	• What is happening in your model? • Where do you see the numbers in the problem? Where is the answer? • I see you started with 1,937 and added up to 1,968. Why can we use addition to solve subtraction problems?	• How can you record what you did using numbers and equations? • What about the numbers made you choose this strategy? • Could you start with 1,968 instead to find the difference? How would this change the actions you take?		
C. Constant difference (using equations) 2,174 + 4 2,178 – 296 + 4 – 300 1,878	• How did you choose the number you added? • How do you know that adding that number doesn't change the result?	• Is there another way you could adjust the numbers to make them easier to subtract? • Which number do you want to make a friendly number? Why?		
D. Using the standard subtraction algorithm 8 12 8 1 17 1,9̸3̸7̸ – 1,888 49	• How did you know where to regroup? • What does the 17 represent? • Why did you change 3 tens to 12 tens? • How does this represent the problem situation?	What would the digit in the tens place need to be so you wouldn't have to regroup 1 hundred as tens?		

(continued on next page)

Subtraction Strategies Forum Discourse Planner page 2 of 4

Monitoring Tool

Anticipated Solution Paths	Instructional Support		Who and What	Order
What ways might students approach the task or activity (including correct, incorrect, and incomplete thinking)?	**Assessing Questions** What will you ask to support exploration?	**Advancing Questions** What will you ask to connect what students did with what you want them to learn?	Who is using the strategy or a variation? Make note of any differences between students' strategies.	In what order will students present?

Subtraction Strategies Forum Discourse Planner page 3 of 4

Class Discussion: Sharing, Comparing & Connecting

Selecting and Sequencing
Which approaches and solutions do you want students to share and compare? In what order? Why?

A. Take away (using a number line)

The take away strategy can be implemented in various ways, including subtracting a friendly number (shown), getting to a friendly number, and compensation (subtracting too much and adjusting). For any variation, highlight three commonalities: starting at the minuend, subtracting the subtrahend, and landing at the answer.

B. Find the difference (using a number line)

The find the difference strategy can be implemented either by adding (subtrahend to minuend) or subtracting (minuend to subtrahend). Compare the minuend's location, the subtrahend's location, and the difference using those numbers and take away strategies.

C. Constant difference (using equations)

Students are likely to adjust the subtrahend to make it a friendly number, then make the same adjustment to the minuend. Connect this strategy to the find the difference strategy, as the difference remains the same as the distance between the minuend and subtrahend.

D. Standard subtraction algorithm

As the newest strategy learned, students may be less likely to choose this strategy or use it accurately. Make connections to instances of informal regrouping in the other strategies.

Evaluation Criteria What will you listen for as students share? What will you look for in their written work?

- Watch and listen for students' use of place value and numbers they find convenient to work with (for example, jumping to or jumping by multiples of 10 and 100).
- Listen for students' understanding of take away and find the difference strategies, showing that they identify the differences in the processes.
- Listen for students' understanding that while there are commonalities in each strategy, some strategies can be implemented in a variety of ways.
- Listen for students' recognition of what might make one strategy more efficient than another.

Connecting Responses
What specific questions will you ask so that students make connections among the presented approaches and solutions and make sense of what you want them to learn?

How did you choose the numbers for your jumps?

- How did the numbers in the problem affect your choice of strategy?
- The take away strategy is also shown on a number line. How are the locations of the answers different? Why are they different?

- How did you decide which number to adjust first?
- How did you choose the number you added to (or subtracted from) the original numbers?
- How is this different from adding up from the lesser number to the greater number? How is it similar?
- What is it about the numbers that makes this an efficient strategy?

- How is this strategy similar to taking away on a number line? How is it different?
- Would it take more or less time to solve 1,968 − 1,937 using this strategy than the find the difference strategy? Why do you think so?

P5

Subtraction Strategies Forum Discourse Planner page 4 of 4

Class Discussion: Sharing, Comparing & Connecting

Selecting and Sequencing
Which approaches and solutions do you want students to share and compare? In what order? Why?

Connecting Responses
What specific questions will you ask so that students make connections among the presented approaches and solutions and make sense of what you want them to learn?

Evaluation Criteria What will you listen for as students share? What will you look for in their written work?

Tool adapted from *Taking Action: Implementing Effective Mathematics Teaching Practices in K–Grade 5, NCTM, 2017*

Subtraction Strategies Work Sample

1   Use the standard algorithm for subtraction to find this difference.

876 − 384

2   Julia solved the problem below. Do you agree with her answer? Explain your reasoning.

$$\begin{array}{r} 29\overset{12}{\cancel{2}} \\ -\ 167 \\ \hline 135 \end{array}$$

3   Find the difference. Choose any strategy you wish. Explain why you chose that strategy.

5,642 − 3,612

4   Use the standard algorithm to find the difference.

a   24,397 − 5,018

b   Explain how you regrouped to find the answer.

Work Place Guide 4C Roll & Subtract 1,000

Summary

Players roll three dice numbered 1–6 and arrange the digits to form a 3-digit number, which they then subtract from 1,000. After that, they each take two more turns to roll the dice, arrange the digits, and subtract from what's left after their previous turn. The goal of the game is to be the closest to 0 after three turns without going into negative numbers.

Skills & Concepts

*   Estimate sums or differences to approximate solutions to problems
*   Fluently add and subtract multidigit whole numbers, using an algorithm or another strategy
*   Compare multidigit numbers based on the meanings of the digits in each place

Materials

Copies	Kit Materials	Classroom Materials
PO P8 Work Place Guide 4C Roll & Subtract 1,000 **PO P9** 4C Roll & Subtract 1,000 record sheet **SB 146** Work Place Instructions 4C Roll & Subtract 1,000	• 9 dice numbered 1–6 • base ten number pieces (6 sets)	

Assessment & Differentiation

If you see that …	Differentiate	Example
Students arrange the dice into numbers but might not be considering the magnitude of the numbers they are creating	**SUPPORT** Encourage students to think about the placement of their digits. Let them roll three dice and explore the different numbers they can make.	Ask questions like these: • *How can you make the greatest number?* • *How can you make the least number?* • *If you make the greatest number possible with your three digits, do you think you'll have enough left after you subtract to take two more turns without going below 0?*
Students use inefficient strategies for subtraction or attempt to use the standard algorithm but are not confident about when to regroup	**SUPPORT** Invite students to play variation A. **SUPPORT** Encourage students to use strategies that are easier for them to see and make sense of than the standard algorithm might be right now.	If a student is having difficulty using the standard algorithm correctly, consider one of these alternatives: • Have them use base ten number pieces or sketches to perform the computation. • Have them represent and solve the problems on an open number line. • Have students play with an adult or a supportive partner and use the game to help teach how to use the standard subtraction algorithm.
Students form numbers that are advantageous and have no trouble performing the subtraction involved	**CHALLENGE** Invite pairs of students to play variation B or C.	

Multilingual learners

• Review important vocabulary such as *hundreds, tens, ones, digits,* and *regroup.* Encourage students to use these terms when they describe their strategy to their partner.
• Play a round of the game and emphasize how to play and the choices you make using gestures, examples, and sketches.
• Encourage students to create their own name for each strategy in a preferred language. Suggest that the name be related to what is happening in the strategy. Record their names on the Subtraction Strategies poster and use them when you talk with students about the strategies they use during the game.

NAME | **DATE**

4C Roll & Subtract 1,000 Record Sheet

Player 1 _____

Player 2 _____

1,000 − _____ =

1,000 − _____ =

NAME _____ **| DATE** _____

🔍 Subtraction Situations

For each problem below, show your thinking. Hints:

- Think about whether the numbers in each problem lend themselves better to the take away strategy or the find the difference strategy.
- Sketch and label an open number line to help, if you'd like.

1 The cell phone was invented in 1973. The telephone was invented in 1876. How many years passed between the two inventions?

2 The science museum has room for 350 people to attend their Great Inventions show. They gave 37 tickets to Mrs. Johnson's class. How many tickets are left?

3 The Hall of Inventions website had 3,706 visitors on Saturday. The website had 26 fewer visitors on Sunday. How many visitors did it have on Sunday?

4 Fill in the blanks with a number or year to make each sentence true.

a Isabella will be 45 years old in 2052. She was born in _____.

b Khaled will be _____ years old in 2060. He was born in 2015.

c Chris will be 75 years old in _____. They were born in _____.

NAME | **DATE**

Subtraction Strategies

Solve the problems below. Use whichever strategy works best for you.

1 Sam's grandmother was born in 1957. Sam was born in 2019. How many years older than Sam is his grandmother?

2 Sam's stepmother is 30 years younger than Sam's grandmother. When was Sam's stepmother born?

3 Nia has to solve the problem 539 – 472. Nia says it is easier to find the difference between 539 and 472 than it is to take away 472 from 539. Do you agree or disagree? Why?

4 Find each sum or difference.

$\frac{1}{10} + \frac{1}{100} =$ _____

$\frac{5}{12} + \frac{3}{12} =$ _____

$1\frac{1}{4} + 3\frac{3}{4} =$ _____

$2\frac{3}{8} - \frac{5}{8} =$ _____

$\frac{3}{4} - \frac{1}{2} =$ _____

$\frac{8}{10} - \frac{15}{100} =$ _____

🔍 Tape Measure Pieces

1 Dakota wants to measure their pencil. They could only find these pieces of a measuring tape. How can Dakota use them to measure their pencil?
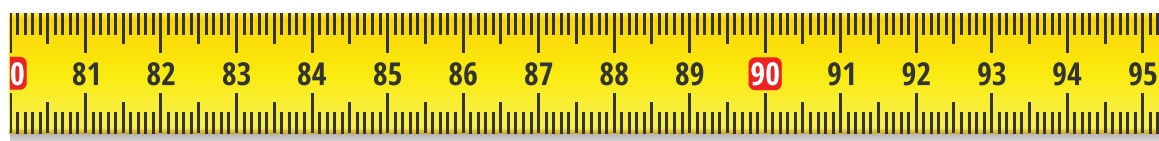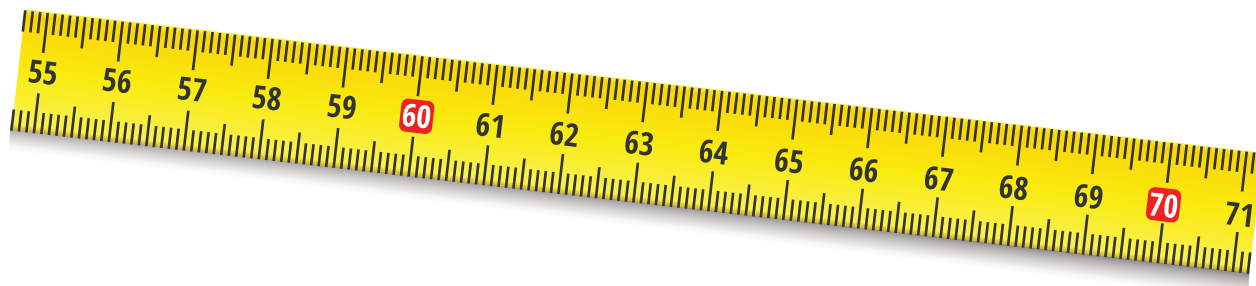
2 Record two different ways to measure the length of your piece of string using the measuring tape pieces above.

We found the length of our string in these two ways:

3 Choose one of the problems below. Solve it using the constant difference strategy.

358 – 247   553 – 128   849 – 522

Rolling Dice

Austin rolled six dice numbered 4–9. He arranged the dice and made these 3-digit numbers: 548 and 796. Use the strategy of your choice to solve each problem. Show your thinking.

1 What is the sum of Austin's numbers?

2 What is the difference between Austin's numbers?

3 What is the greatest 6-digit number Austin can make with the numbers he rolled?

4 What is the least 6-digit number Austin can make with the numbers he rolled?

5 Austin rolled the dice again. This time he made these numbers: 497 and 546. Austin says he can add 500 and 543 and get the same sum as 497 and 546. Do you agree or disagree? Why?

6 Austin says he can find the difference between 497 and 546 by finding the difference between 500 and 549. Do you agree or disagree? Why?
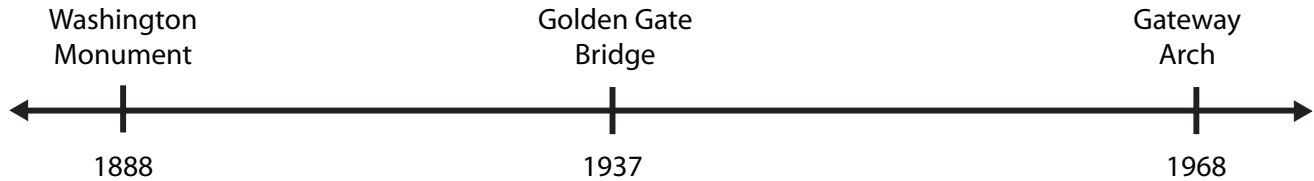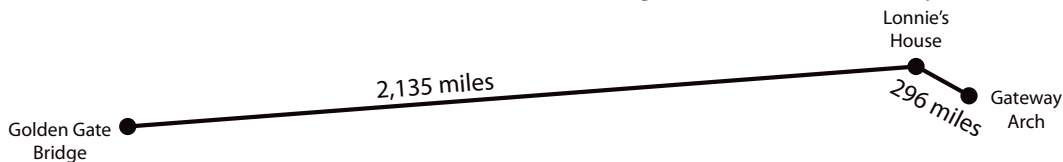
NAME _____ | DATE _____

🔍 Subtraction Practice

The timeline below shows the year when each structure was completed. Use the timeline and the strategy of your choice to solve the problems. Show your thinking.

Washington Monument	Golden Gate Bridge	Gateway Arch
1888	1937	1968

1 Which structure is the oldest? How many years older is it than the Golden Gate Bridge?

2 Which structure is the newest? How many years newer is it than the Golden Gate Bridge?

3 Lonnie wants to see the Gateway Arch and the Golden Gate Bridge. How much farther does he live from the Golden Gate Bridge than the Gateway Arch?

Lonnie's House

2,135 miles

296 miles

Golden Gate Bridge

Gateway Arch

4 Choose two or more of the problems below to solve using the standard algorithm for subtraction.

$$2,025 - 1,984 \qquad 1,987 - 1,864 \qquad 2,071 - 1,993 \qquad 2,005 - 1,967$$

NAME | DATE

When Was That Invented?

Solve each problem using the strategy of your choice. Show your thinking.

Great Inventions

Invention	Year
First camera phone	2000
Ray Tomlinson: email	?
Marie Van Brittan Brown: first camera doorbell	1969
Henry Ford: Model T	1908
Karl Benz: Motorwagen	1885
Thomas Edison: lightbulb	1880
The Pony Express: mail service	1860
Humphry Davy: arc lamp	?

1 The first email was sent 111 years after mail was sent by the Pony Express. When was the first email sent?

2 Humphry Davy invented the lamp 73 years before the light bulb. What year did Humphry Davy invent the arc lamp?
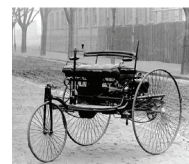
3 A team of people worked together to create the first camera phone. How many years before the first camera phone was invented did Marie Van Brittan Brown invent the first camera doorbell?

4 How many years passed between the introduction of Henry Ford's and Karl Benz's cars?
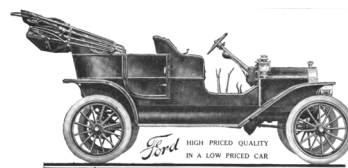
Model T   Motorwagen

Using Subtraction Strategies

Look at each subtraction problem below. Think about which strategy makes the most sense for each problem. Choose 4 problems to solve. Use each strategy once.

1 3,601 – 589

Strategies

- Take away
- Find the difference
- Constant Difference
- Standard Subtraction Algorithm

2 789 – 354

3 2,623 – 524

4 1,005 – 896

5 6,357 – 92

6 7,256 – 5,013

🗑 Work Place Instructions 4C Roll & Subtract 1,000

Object of the Game

Use dice rolls to form 3-digit numbers to subtract from 1,000. The player with the final result closest to 0 without going past 0 is the winner.

Get Ready to Play

- Each player needs their own **4C Roll & Subtract 1,000 record sheet**.

- Players need **3 dice numbered 1-6** to share.

- Players each roll 1 die. The player with the greater number goes first.

- Each player labels a record sheet with the date and both players' names. Players keep track of their own and their partner's results.

On Your Turn

1 Roll the 3 dice and make a 3-digit number using the digits rolled. Use an efficient strategy to subtract the number from 1,000.

2 Share your strategy with your partner and ask them to check your work.

Ending the Game

After 3 turns, the player with a final positive result closest to 0 wins. Record a comparison statement at the bottom of your record sheet using <, >, or =. Draw a loop around the winning total.

Variations

A Play Roll & Subtract 250 by changing the first number on the record sheet to 250. Roll 2 dice each time. Use two dice numbered 1–6, two dice numbered 4–9, or one of each.

B Play Roll & Subtract 10,000 by changing the first number on the record sheet to 10,000. Roll 4 dice each time. Use four dice of any combination numbered 1–6 and 4–9.

C Change the rules to allow going into negative numbers. The winner is the player with the final result closer to 0, either over or under, after 3 turns.

NAME _____ | DATE _____

🏠 Helpful Hints

1 Jack has to solve the problem 281 – 266. Which strategy would you recommend? Show how you would solve the problem.

2 Zia has to solve the problem 311 – 287. Which strategy would you recommend? Show how you would solve the problem.

3 Randy says that the standard algorithm is the most efficient way to solve 358 – 247. Do you agree or disagree? Why?

4 Lani says that the standard algorithm is the most efficient way to solve 412 – 259. Do you agree or disagree? Why?

5 Put these numbers in order from least to greatest. Write comparison symbols (< or >) between each pair of numbers.

| 629,874 | 629,478 | 692,847 | 692,487 |

_____ ◯ _____ ◯ _____ ◯ _____

157

🏠 Think Before You Add page 1 of 2

1 Study each problem before you begin to solve it. Think about which strategy would be most efficient. Choose your strategy and solve the problem. Use the space below the problems to show your thinking.

a 99 + 43 = _____

b 878 + 121 = _____

c 213 + 762 = _____

2 Use the standard algorithm for addition to solve the problems below.

$$
\begin{array}{r} 189 \\ + 215 \\ \hline \end{array}
\qquad
\begin{array}{r} 57 \\ + 84 \\ \hline \end{array}
\qquad
\begin{array}{r} 308 \\ + 417 \\ \hline \end{array}
$$

3 Look at the problems in problem 2. Find one that might have been solved with another more efficient strategy.

a Which problem did you choose?

b Which strategy could be more efficient? Why?

(continued on next page)

NAME _____ | DATE _____

Think Before You Add page 2 of 2

4 Use the symbols <, >, or = to compare each pair of fractions.

ex $\frac{1}{3}$ ⟩ $\frac{1}{4}$ **a** $\frac{3}{6}$ ◯ $\frac{2}{3}$ **b** $\frac{1}{3}$ ◯ $\frac{1}{4}$

c $\frac{1}{2}$ ◯ $\frac{2}{4}$ **d** $\frac{1}{3}$ ◯ $\frac{2}{4}$ **e** $\frac{2}{6}$ ◯ $\frac{1}{3}$

5 Write an equivalent decimal for each decimal fraction.

a $5\frac{9}{10}$ = _____ **b** $6\frac{5}{100}$ = _____ **c** $8\frac{1}{10}$ = _____

d $1\frac{20}{100}$ = _____ **e** $3\frac{4}{10}$ = _____ **f** $9\frac{50}{100}$ = _____

6 **CHALLENGE** Last year, Monica's snake was 9.62 inches long. Now her snake is 12.37 inches long. Show your thinking for each question below.

a How much did Monica's snake grow during the last year?

b How much more does her snake need to grow to be exactly 13 inches?

NAME | DATE

🏠 Number Cards page 1 of 2

Hayley pulled 6 cards from a deck of cards. She arranged the cards into these 3-digit numbers: 348 and 956. Use the strategy of your choice to solve each problem. Show your thinking.

1 What is the sum of Hayley's numbers?

2 What is the difference between Hayley's numbers?

3 What is the greatest 6-digit number Hayley can make with the cards she pulled?

4 What is the least 6-digit number Hayley can make with the cards she pulled?

5 Hayley pulled 6 more cards. This time, she made these numbers: 278 and 421. Hayley says she can add 299 and 400 and get the same sum as 278 and 421. Do you agree or disagree? Why?

6 Hayley says she can find the difference between 278 and 421 by finding the difference between 300 and 443. Do you agree or disagree? Why?
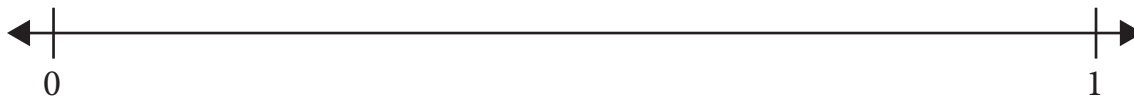
77

NAME _____ | DATE _____

Number Cards page 2 of 2

Review

7 Add these pairs of fractions.

$\frac{5}{10} + \frac{37}{100} =$ _____ $\frac{6}{10} + \frac{6}{100} =$ _____ $\frac{4}{10} + \frac{12}{100} =$ _____ $\frac{13}{10} + \frac{87}{100} =$ _____

8 Estimate the location of each decimal on the number line.

0.4   0.1   0.8   0.25   0.55   0.95

0   1

9 There are 137 third graders, 139 fourth graders, and 153 fifth graders at Kamala Harris Intermediate School. How many students are there in all? Show your thinking.

10 CHALLENGE Maria, Ana, and Pedro are all friends. One of them lives in a red house, one lives in a blue house, and the other lives in a green house. The person who lives in a green house has more than 3 letters in their name. The person who lives in a red house is not Ana. Pedro passes the green house on his way home from school. Who lives in each house?

NAME | DATE

Thinking About Subtraction page 1 of 2

Look at each subtraction problem below. Think about which strategy makes the most sense for each problem. Choose 4 problems to solve. Use each strategy once.

1 4,875 – 4,859

Strategies

- Take away
- Find the difference
- Constant Difference
- Standard Subtraction Algorithm

2 1,685 – 98

3 699 – 424

4 635 – 278

5 3,021 – 2,167

6 8,072 – 366

79

Thinking About Subtraction page 2 of 2

Solve each problem using an efficient strategy. Show your thinking.

7 Uncle Terry was born in 1996. How old is he now?

8 Jing-Lee's stepfather is 42 years old. What year was Jing-Lee's stepfather born?

9 The third grade gymnastics team has 279 points. In order to place in the top three teams, they'll need a score of 425 or more. How many more points do they need to earn in order to rank in the top three?

10 CHALLENGE Brianna climbed to the first platform of a water slide in 1 minute. The climb to the second platform took her 20 seconds longer than her climb to the first platform. Her climb to the third platform took 0.5 minutes longer than her climb to the first platform. Once she was on the third platform, she had to wait ½ hour to get to the top. How much time did it take from the time she first started climbing the stairs until she got to the very top?

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